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1936

Again, the time has arrived for us to bid farewell to one year, and to mark the coming of another. On this occasion the task, as a whole, is not an unpleasing one; for, as years go, 1936 may be accounted a good one, while 1937 holds out promise of being still better. Let it be the resolve of the great Gas Industry to do all that within it lies to ensure that it shall be so. Carrying into effect this resolution will involve, of course, not only a firm determination successfully to overcome such obstacles as may arise, but something a good way beyond that—something which is too frequently overlooked in the struggle to breakdown difficulties—that is to say, unceasing effort to take the fullest possible advantage of the flowing tide of prosperity. Opportunity is knocking at the door; let us all be prepared to recognize and welcome to the full so desirable a guest.

A Mighty Empire

It cannot be said that everything is well, while so much time and thought, in so many parts of the world, are being devoted to warlike subjects, and while one country in Europe is being deluged with blood. But, aroused at long last to the realities of the situation, there is full reason to anticipate that day by day the influence for peace of our own mighty Empire, both within and without its borders, will grow as only increasing material strength can cause it to grow. More than statesmanship—vital though that be—is needed to enable the British Empire to occupy indefinitely its proper place in the scheme of things; it must be incontestably powerful for defence, and it must remain true to itself. The material strength is being added to hourly; the moral strength is as unshakable now as ever it was.

Should anyone, upon the spur of the moment, feel inclined to challenge the correctness of the latter assertion, he may convince himself of its accuracy by casting his mind back to the early part of this month and reflecting upon the manner in which the people of the Empire met a crisis as grave as it was unexpected. Within the brief space of a few days a new, and a different, page in the history of the Empire was written, and from the writing of it we may feel assured that, despite unparalleled circumstances, Throne and People have been drawn even closer together, and that both have emerged from the ordeal no whit less strong than they were before. In 1936, from King George V., of great performance, through King Edward VIII., of great promise, we have passed to King George VI., whose subjects, both near and far away, unite in the wish that his reign may be long and happy. With the Coronation date—most thoughtfully—unaltered, there are prospects of a "bumper" start-off to the reign with the coming year.

Growing Prosperity

Facts affording convincing support to the optimistic view which we take of the prospects of the coming year are to be drawn in abundance from the experience of the twelve months now behind us. It was remarked in these pages just prior to the introduction of the last Budget that, after several years that were none too good, the country had enjoyed a recovery which was full of promise for the future, both for the individual and for the great national industries, including our own. On March 31, the nation's financial year closed with a real surplus of practically £15,500,000. Revenue had exceeded the estimate by £18,500,000, and was £36,000,000 higher than the year before, while expenditure was only £16,000,000 more than had been anticipated. There had been increases in revenue exceeding the estimates under almost every head. It is true that, in the result, the already far-too-high standard rate of income-tax was made still higher by the addition of 3d., making it 4s. 9d. in the pound, but even so the "wind" was "tempered" to married persons of modest means, and in any case it was pointed out by the Chancellor of the Exchequer, in view of the heavy National Defence programme, that "greater comfort must be subordinated to greater safety."

The recovery in British overseas trade recorded in every month during 1935 was continued in 1936, with the result that, at the end of November, British exports, at £400,250,000, were over £9,000,000 above January-November, 1935, and nearly £38,500,000 more than for the like period of 1934. A feature of the statistics, too—in addition to the increased trading which they reveal—is that most of the increase on 1935 has been in connection with manufactured articles. From one point of view this must be regarded as satisfactory, though there is general recognition of the pressing need for big increases in our exports of coal.

In the circumstances indicated, of course, unemployment has been diminishing in a highly gratifying manner, though here again we are up against the unfortunate fact that whereas, taken as a whole, the situation is so much improved with regard to employment, the benefits have been most unequally distributed. There are still far too many who, through no fault of their own, have no part in the encouraging signs to which Lord Templemore alluded a few days ago in the House of Lords, when, in answer to a question as to whether the requisite amount was being saved to ensure that the value of the "national estate" was not diminished, he replied that there was much evidence to show that savings were far more than sufficient to take charge of the processes of depreciation and obsolescence. It was, he contended, one of the most encouraging signs of our economic state that savings had

been maintained at such a satisfactory level. This applied particularly to small savings. The savings of wage-earners had been wonderfully maintained during the slump, and now, with the industrial recovery, they were constantly increasing. One authority had placed the total amount of savings in this country at £3,000,000,000, and had expressed the opinion that this amount was at the present time increasing at the rate of considerably over £100,000,000 a year. With all this, we are unhappily still compelled to describe certain parts of the country as "distressed areas." May the tide of prosperity soon be induced to flow over these also.

The Gas Industry

Let us now briefly examine how our own Industry has fared amid these varying conditions at home and abroad of politics and economics.

Although the figures are not yet available, there is already ample evidence to show that from the point of view of the Gas Industry the year 1936 has, in many respects, been much more satisfactory than its predecessors. The external causes of this fortunate result are to be found in the general improvement in industry, trade, and business which has taken place throughout the country.

Most of the industries which use gas in their various processes—and their number is constantly increasing—are prospering, and in recent months the beneficial effects of the Government's re-armament policy have begun to show themselves even in districts where industrial depression has been most severely felt.

While these causes must in themselves have improved the position, progress has been accelerated by reason of the fact that the Industry has been in a position not only to cope with the increasing demand for gas, but, by providing the necessary apparatus to fulfil new requirements, and by the offer of scales of charges arranged on a more scientific basis than formerly, to meet successfully the competition of other media of heat, light, and power.

Unfortunately, however, the coal position, which is dealt with in detail elsewhere, has been a disturbing factor during the year, for an industry which uses annually some 18 million tons of coal naturally views with concern the steadily increasing prices demanded for its essential raw material of manufacture, and when it is remembered that there has also been an increase in the cost of plant and appliances, it is not surprising that many undertakings have found it necessary to increase their gas charges, while others have with difficulty maintained them at their existing level.

Thus, although the ceaseless endeavours of the Industry to inform the public as to which of their multifarious needs can best be served by the use of gas are taking effect, and are powerfully aided by the fact that the claims put forward on behalf of gas are invariably substantiated in practice, the difficulties of meeting the keen competition of electricity, oil, and raw coal are of great concern. So that while the growing recognition and appreciation of the value and cheapness of gas for domestic and industrial purposes are to be welcomed, it would be a grave mistake to assume that the position already gained can be held, or that further progress can be made, without continued and intensive effort and co-operation on the part of every branch of the Industry and on the part of each individual undertaking. It is therefore gratifying to be able to record that from all directions have come reports of improvement in organization—both national and local—of concerted action to safeguard the interests of the Industry, and of the realization by individual units that they must strive for maximum efficiency, not only for their own but for the general good.

The British Gas Federation, though only in the third year of its existence, has already justified the hope that the creation of a body representative of every branch of the Industry would be able to take more authoritative and influential action than had hitherto been possible, and the great meeting which it organized to protest against the Coal Mines Bill introduced in the Spring undoubtedly exercised a powerful influence in securing the withdrawal of that ill-considered measure, and in obtaining assurances that in the Bill which is to be substituted for it more adequate safeguards will be provided for consumers.

The Federation was responsible for the organization of the Gas Exhibit at the British Industries Fair in February, the outstanding excellence of which was acknowledged by all who saw it, and also for the worthy representation of the Industry at many important Conferences and Exhibitions.

The Joint Co-ordinating Committee which was set up to co-ordinate the work of the National Bodies and to prevent overlapping has dealt with many important matters. This Committee, through its Technical Sub-Committee which represents all the Development Centres, has also been responsible for the preparation of several important publications relating to the work of those Centres.

In considering co-operative effort mention must also be made of the agreement which has been reached with members of the National Bodies in Scotland whereby those organizations will in future be of more direct service to, and ensure still closer co-operation with, their Scottish members.

The Women's Gas Council whose first Annual General Meeting was held in May, was able to report an encouraging start, and subsequent efforts to stimulate in various ways the interest of women all over the country in the use of gas have been very successful.

The National Gas Council

The work of the National Gas Council continues to expand rapidly, and a detailed account of its activities, general, legal, and Parliamentary, would inevitably outrun the limits of a short review; indeed, only some of the more important can be mentioned.

The coke position, rendered in some respects difficult by the rapidly increasing demand, has been constantly under review, and steps have been taken in order to secure further co-operative action in regard to marketing. While the formation of a Central Coke Organization to deal with the fixing of prices throughout the country is regarded as impracticable, similar results can be achieved by the creation of district organizations on the lines of the London and Counties Coke Association, and in some cases such organizations are already in course of formation. A later section of this Review deals in greater detail with the coke situation.

As usual the National Gas Council has had to deal with a number of rating questions, the most important of which concerned certain difficulties which have arisen in connection with the valuation and assessment of public utility hereditaments. The Memorandum on the subject presented to the Central Valuation Committee by the Conjoint Conference of Public Utility Associations has been examined by that body in the light of further information supplied by a deputation of the Conference, and through the medium of a questionnaire the additional information in regard to the valuing of undertakings extending into the area of more than one rating authority has been obtained and is now being considered.

Difficulties in regard to the assessing of public utility undertakings for the purpose of drainage rates to be levied under the Land Drainage Act, 1930, have also been the subject of discussion between the Conjoint Conference and the Catchment Boards Association, and substantial progress towards agreement has been made.

Legislative and Parliamentary

Turning now to legislative and Parliamentary matters, it should be recalled that, while during the year there was no alteration in the general law affecting gas undertakings as a whole, several Private Bills of importance promoted by gas undertakings were passed, and there are numerous Public Bills affecting the Gas Industry which have been or are about to be placed on the Statute Book.

Into the former category fall The Gas Light and Coke Company (No. 2) Bill and the York Gas Company Bill, both of which received the Royal Assent in July. The purpose of both Bills was to secure powers to compel housing authorities to give facilities to the Companies to carcass council houses in course of erection. The principle involved is a logical development of that fought for in the case of the Kettering Gas Bill and now incorporated in the general law, and both Companies are to be congratulated on the success of their efforts to obtain recognition of an important principle.

In 1935 the South Metropolitan Gas Company promoted a Bill to provide among other things for the measurement of gas in terms of therms instead of in cubic feet. It was opposed by the Board of Trade and subsequently dropped. A similar Bill was, however, introduced in 1936 and, being again opposed by the Board of Trade, was submitted to a Joint Committee of both Houses of Parliament. The Committee decided that the Company's Bill should be allowed to go forward, and that other gas undertakings desiring to use a therm meter should be authorized to do so subject to the same safeguards as those provided in the Bill. It found, however—thus confirming the view submitted in evidence on behalf of the National Gas Council—that it is not expedient at the present time to introduce general legislation regarding the type of meter to be used. In consequence of the Committee's report the Bill was passed by both Houses and received the Royal Assent in July.

As a result of the agitation which followed the introduction by the South Metropolitan Gas Company of their new block rate tariff, which was subsequently withdrawn, the Government has set up a Joint Select Committee to enquire into the powers of regulating charges possessed by gas companies authorized to operate under the basic price and basic dividend system, and to consider whether adequate protection is afforded to the interests of the different classes of gas consumer under such powers. The Joint Select Committee held its first meeting on Dec. 15, when preliminary arrangements were made for the next sitting after the Parliamentary Recess. All the interests involved, including the National Gas Council, will be represented at the sitting of the Committee.

As was to be expected, much of the general legislation passed during the last twelve months or now under consideration affects gas undertakings to a greater or less degree. The Trunk Roads Bill which has passed through all stages in the House of Commons provides for the transfer to the Minister of Transport of certain of the principal roads in the country, and necessarily affects the interests of all public utility undertakings in those roads. Amendments put forward on behalf of the Conjoint Conference of Public Utility Associations and designed to afford greater protection to their interests were ruled out of order, but in his speech on the Third Reading the Minister gave a categorical assurance that the Bill involved a transfer to him of all the liabilities and obligations at present borne by the highway authorities whose responsibilities were being transferred.

The Air Navigation Bill now on the Statute Book contained in its original form features objectionable to all the public utilities including the railways, but as a result of representations to the Minister while the Bill was before Parliament modifications were secured. The land of public utility undertakers is exempted absolutely in respect of compulsory purchase, and before any work is carried out in respect of buildings on such land there must be notice and consultation.

Part I. of the Public Health Act, 1936, which consolidates, and to some extent amends, previous Acts relating to public health matters *per se*, was amended in several respects in its earlier stage on representations made by the Conjoint Conference, safeguards in the interests of public utility undertakers being inserted in clauses 38, 70, and 276. Part II. of the Act which deals, *inter alia*, with the disposal of trade effluent into sewers, made no provision in its original form for the preservation of existing rights, however acquired, to discharge into sewers. Such rights are possessed by many gas undertakings, and, as it was of great importance that they should be retained, the National Gas Council took the matter up with the Ministry, and were successful in securing the insertion of a clause to that effect.

A new Factories Bill is in the offing, and as it must affect gas undertakings in many respects, the National Gas Council has been in close touch with the Home Office in regard to it.

Private Bills promoted by the London Passenger Transport Board, the Surrey County Council, and other authorities were the subject of representations by the National Gas Council in that in certain respects they adversely affected the interests of gas undertakings, and it is satisfactory to be able to report that in each case agreement in regard to amendment was reached.

The ceaseless output of legislation of all kinds necessarily demands the utmost vigilance on the part of those whose business it is to safeguard the interests of all gas undertakings, both individually and collectively, and the Industry is to be congratulated upon the fact that the machinery which it has created for that purpose has proved highly effective.

Amalgamation and Grouping

The past year has seen a number of statutory amalgamations, and others which have been announced will take place shortly.

Holding companies have been active and new names have appeared. Set out below are the acquisitions reported during the current year. After the name of the holding company the name of the controlling gas company is inserted, if any, and in the case of companies associated with Close Brothers, Ltd., or Dawnay Day & Co., Ltd., the appropriate name is inserted.

During the year the Imperial Continental Gas Association has promoted a Bill in Parliament to permit investments in utility undertakings in this country, but no public announcement of any acquisitions has been made.

The following is a record of statutory amalgamations since the review in these columns in 1935. The figures after each name represent the gas sold in 1935 in millions of cubic feet:

Late 1935.

Stirling Company	218	Bridge of Allan, 17	
Tottenham Company	3,984	Biggleswade, 31; Hitchin, 156; Shefford, 2; Stevenage, 27	
Portsmouth Company	2,692	Gosport, 484	

1936.

Wandsworth Company	5,172	Leatherhead, 193; Walton-on-Thames and Weybridge, 252	
Bath Company	1,318	Melksham, 42	
*Stroud Company	210	*Brimscombe, 11; *Tetbury, 9	

(*These three Companies were already controlled by the Severn Valley Gas Corporation.)

Edinburgh Corporation	3,443	South Queensferry, 8	
Leicester Corporation	2,507	Syston and Thurmaston, 16	
Sheffield Company	6,579	Bakewell, 22	
Sunderland Company	1,287	Seaham, 63	
Wellingborough Company	287	Irthlingborough, 33	

The following amalgamations are announced but not yet authorized by Statute:

Chorley Corporation	241	Adlington, 15	
Sheffield Company	6,579	Barnsley, 202	

(The Barnsley Corporation are promoting a Bill for the compulsory transfer to them of the Barnsley Company.)

Taunton Company	215	Ilminster, 17; Milverton, 4; Wiveliscombe, 9	
Pontypool Company	123	Cwmbran and Pontnewydd, 16	
Northampton Company	1,042	Olney, 11; Newport Pagnell, 24	
Kirkburton Company	20	Shelley and Shepley, 11	
Southampton Company	1,695	Winchester Gas Undertaking, 212	
Winchester Corporation		Winchester Water Undertaking	
Bath Company	1,318	Frome, 82	
Portsmouth Company	2,692	Hayling Island, 5	
Shanklin and Ventnor Company	109	Sandown (I.O.W.), 59	
Ormskirk Company	95	Croston, 8 (Chorley R.D.C.)	
*Runcorn Company	109	*Frodsham, 29	

(*Both these Companies are controlled by the United Kingdom Gas Corporation.)

The following amalgamations have been announced in Scotland:

Kirkcaldy Corporation	201	Dysart, 15	
St. Andrews Company	94	Elie and Earlsferry, 9; Pittenweem, 14	
Alloa Corporation	216	Alva, 37	

Holding companies (which are in alphabetical order) have in late 1935 or 1936 obtained control of the following companies, the figures again indicating the gas sold in 1935 in millions of cubic feet:

Associated Gas and Water Undertakings.

Chesham	71	Guildford	415	Yorktown and Camberley	293
Farnham	206	Hayward's Heath	132		

Associated Utilities. Controlled by Mid-Southern Utility Company.

Basingstoke	65

British Gas Light Company.

Brandon	6	Huntingdon	21	Mildenhall	3
Diss	14	Littleport	15	Thetford	22

Caledonian Gas Corporation (Close Bros.). Controlled by United Kingdom Gas Corporation.

Beith	16	Muirkirk	13	Vale of Leven	137
Callander	6	Strathaven	18		

Gas Consolidation (Dawnay Day).

Long Eaton	315	Melton Mowbray	52	Uppingham	11

General Gas and Electricity.

Amlwch	4	Kington	7	Llandovery	7

Palatine Gas Corporation (Dawnay Day).

Ashton-under-Lyne	309	Mossley	136

Severn Valley Gas Corporation (Dawnay Day).

Bidford-on-Avon	3	Market Drayton	16	Ross-on-Wye	31
Chepstow	20	Middlewich	19	Wellington (Salop)	185
Malpas	3				

(Completion of the acquisition of the Much Wenlock and the Winsford Undertakings is awaited.)

South-Eastern Gas Corporation. Controlled by the Gas Light and Coke Company.

Ascot	127	Mid-Kent	96	New Romney	13
		Uxbridge	1 018.		

South Wales Gas Corporation.

Llantrisant	5

South Western Gas Corporation (Close Bros.).

Beaminster	4	Somerton	4	Tavistock	43
		Wedmore	2		

South West Utilities.

Barnstaple	95

Stellite (Low Temperature Fuel Manufacturers).

Connah's Quay	27	Conway	41	Hawarden	3
		Mold	16		

United Kingdom Gas Corporation (Close Bros.).

Castleford and Whitwood	153	Harrogate	558	Pickering	22
		Hyde	223	Quaker's Yard	17
East Ardsley	21	Llanelly	112	Ramsbottom	97
Easingwold	9	Malton	72	Rothwell	61
Garforth	16	Otley	57	Whitby	60
Winslow	5	York	865		

This record shows that numerically the United Kingdom and Severn Valley Gas Corporation have been most active. The South-Eastern Gas Corporation, however, has the biggest single purchase in the Uxbridge Company, an undertaking supplying a very large area to the north-west of London.

The Palatine Gas Corporation is understood to be a subsidiary of Gas Consolidation which has been founded to control any undertakings in Lancashire in which the group may be interested.

Stellite is the name of a firm making low-temperature fuel at Queensferry-on-the-Dee, in Flintshire.

The statutory amalgamations accomplished to the time of writing are seen to involve the absorption of 16 undertakings involved 1,366 millions of cubic feet, and those not yet completed involve the absorption of 15 gas undertakings selling 704 millions of cubic feet.

The Scottish absorptions will take four undertakings into their larger neighbours, selling 75 millions of cubic feet.

The holding companies account for 64 purchases between them, although some of these may have occurred late in 1935. The total quantity of gas involved was 6,472 millions of cubic feet.

Although not an amalgamation, it is interesting to note that the undertaking of the North Pembrokeshire Water and Gas Company (3·5 millions) may be purchased by the Fishguard and Goodwick U.D.C. under an Act of Parliament obtained this year.

Institution of Gas Engineers

The membership of the Institution continues its steady increase and this year exceeds sixteen hundred, comprising 1 Honorary Life Member, 37 Honorary Members, 894 Members, 545 Associate Members, 136 Associates, and 49 Students—a total of 1,662. The increase has been principally in the classes of Associate Member and Student.

The 73rd Annual General Meeting was held in London from May 26 to 29. The enforced absence through illness of the President, Colonel W. Moncrieff Carr, was regretted by all present. The Chair was taken at short notice and with notable success by the Senior Vice-President, Mr. Stephen Lacey. The Meeting was again well attended. Six Papers, dealing with a wide variety of subjects, both technical and commercial, were presented and discussed. There was also a Discussion by Corporate Members in private of the Proposed Amendment of the By-Laws governing admittance to the Institution. The holding of the Reception and Dance in the large Ball Room at Grosvenor House was much appreciated.

The Meeting was further marked by the resignation of Mr. W. E. Price from the office of Honorary Secretary of the Institution, so ably held by him for 23 years. Mr. Price, whose health has latterly been causing concern to his many friends, was succeeded by Mr. John Terrace.

The following Medals for 1935 were presented: The Institution Gold Medal to Mr. G. Dixon, the H. E. Jones London Medal to Mr. W. L. Boon, the Institution Silver Medal to Mr. T. P. Ridley, and the Institution Bronze Medal to Mr. W. Hodkinson. At the termination of the Meeting, Mr. Stephen Lacey assumed the Presidency, and Mr. R. Robertson took office as a Vice-President, the Senior Vice-President being Mr. H. C. Smith.

The Visits included an ambitious and highly successful trip by Special Trains to the Corby Works of Stewarts & Lloyds, Ltd., where the coke ovens, blast furnaces, Bessemer plant, rolling mills and tube works were inspected. Visits were made to the Cadby Hall Factory and Greenford Works of J. Lyons & Co., Ltd., and to the Neasden Works of Ascot Gas Water Heaters, Ltd. A whole-day excursion embracing Portsmouth, where the Hilsea Gas-Works and the Showrooms of the Portsmouth and Gosport Gas Company were visited, and the Isle of Wight was made in perfect weather and was greatly enjoyed.

The 8th Autumn Research Meeting, held on Nov. 3 and 4, was outstanding in the high standard and interest of the Reports and Papers presented—comprising eight Committee Reports, three Papers, and the Institution Gas Research Fellowship Report—and in the excellence of the discussions and the sustained high attendance. Attention may be particularly drawn to the 3rd Report of the Gasholder Committee which contains, *inter alia*, a number of recommendations as to the inspection, maintenance, and repair of water-sealed, piston type (waterless), and high-pressure gasholders to which the Committee urges that immediate effect be given by all gas undertakings.

The Research Chemists and Assistants retained by the Institution have continued their investigations at Leeds and Coventry. The Gas Research Fellowship, which became vacant in March, has been awarded to Mr. A. A. Taylor (Oldham). On the recommendation of the respective Committees the William Cartwright Holmes Scholarship in Gas Engineering and the Corbet Woodall Scholarship in Gas Engineering have been awarded for 1936-37 to Mr. D. W. Davison (Dunfermline) and to Mr. D. G. R. Davies (Keighley).

The Council of the Institution, on the recommendation of the Arthur Duckham Memorial Fund Committee, has made the first Arthur Duckham Research Award for 1936-37 to Dr. A. E. Haffner (Gas Light and Coke Company). It takes the form of a Fellowship of the value of £350 for the purpose of investigating abroad for one year recent developments in the manufacture, distribution, utilization, and/or supply of gas and its by-products. Accordingly Dr. Haffner is carrying out, under the direction of Professor Dr. Karl Bunte at the Gasinstitut, Karlsruhe, Germany, an investigation of criteria for assessing the combustion properties of town gas and their correlation with the performance of the gas in domestic appliances.

The Institution continues to establish and maintain close contacts with other Research Organizations both at Home and Overseas. By such collaboration and exchange of information it hopes, within the means at its disposal, to widen its research activities and to make available to gas engineers an increased quality and variety of information relating to technical developments of interest to them. A new and notable example of this co-operation is the formation of a Joint Committee on Complete Gasification, comprising representatives of the Joint Research Committee of the Institution and Leeds University and of the Fuel Research Division of the Department of Scientific and Industrial Research.

The Institution continues to take an active part in the work of the International Gas Union, and its representatives have attended during 1935-36 the meetings on the Continent and in London of the Council of the Union and of its Technical Committees, which are preparing Reports for presentation at the Third International Gas Congress in Paris in June, 1937. The Institution has accepted an invitation from the Council of the Union to sponsor two or more Papers for presentation at that Congress. A Gas Publicity Committee of the International Gas Union has recently been formed, under the Chairmanship of Mr. C. Valon Bennett.

Technical developments at home and overseas are being constantly watched. The Technical Assistant Secretary and Dr. F. J. Dent (Research Chemist) visited Germany to ascertain the progress made in the development of a process for the production of town gas from brown coal by complete gasification. The Technical Assistant Secretary has also visited the Gasinstitut, Karlsruhe, in connection with the work there of the Arthur Duckham Research Fellow.

The 13th Report of the Gas Education Committee, which was presented and discussed at the 8th Autumn Research Meeting of the Institution, includes particulars of amendments made to the Education Regulations during the past year in respect of qualifications required from candidates for the Diploma Examinations of the Institution, of the Syllabuses of the Ordinary and Higher Grade Examinations, and of the Oral Examination of the Gas Fitting Examinations of the City and Guilds of London Institute. The comparative statistical schedule of the 1935 and 1936 Examination results, included in the Report, indicates that the number of examinees is being maintained. Eight Diplomas in Gas Engineering (Manufacture) and one Diploma in Gas Engineering (Supply) were awarded in the 1936 Examinations.

The Accounts of the Benevolent Fund show that the amount of contributions in 1936 was slightly greater than in 1935. To these contributions must be added the sum of £400, being the proceeds of the W. E. Price Presentation Fund which Mr. Price, with characteristic generosity, handed to the Benevolent Fund and which has been suitably invested in its account. The number of cases now assisted by the Fund is 26, as compared with 22 in 1935.

The B.C.G.A.

This year, which marked the silver jubilee of the British Commercial Gas Association, saw also the loss of two men whose work had been bound up with it since its inception and whose enthusiasm and driving force have largely helped to bring the Association to its present pre-eminence among co-operative publicity organizations.

Sir Francis Goodenough, the first of these two men, is happily still with us, although by his retirement he vacated the position of Chairman of the Executive Committee of the Association which he had held for an unbroken period of twenty-five years. We hope that many years, not only of pleasant recreation but of usefulness to the Industry (for Sir Francis is by no means relinquishing all his gas activities), will be spared to him.

The B.C.G.A.'s second loss was occasioned by the death of its General Secretary, J. C. Walker, at the early age of 48. His death has left a gap which will be hard to fill, for behind his unobtrusive manner lay great knowledge of and experience in the problems affecting the Gas Industry. Earlier in 1936 he carried out what was destined to be his last piece of important work on behalf of the Industry he served so faithfully and well. This was a complete investigation into the methods by which the national gas organizations could be brought into closer touch with undertakings in Scotland. His report received unanimous approval from all concerned and paved the way for the appointment of a resident officer in Scotland, who will be carrying out Mr. Walker's suggestions towards a closer co-ordination.

The Jubilee Conference in Bath drew what must be one of the largest attendances known at any of its annual meetings. The keynote of the Conference was "Gas, Public Servant No. 1," and a series of informative and interesting papers described the co-operation between municipalities and the Industry. Papers on the uses of gas in the steel, tinplate, and pottery industries attracted much attention; and the Conference, auspiciously opened by the statesmanlike Address of its President, Mr. H. Stanley Taylor, also included a private discussion on the question of national marketing which may well be productive of important future developments in this direction.

The Association's Advertising in the national and district newspapers during the year was maintained in intensity, and the high level of its advertising schemes attracted favourable comment among experts. The *Manchester Guardian Commercial*, in an article on "Press Advertising in 1936," stated that "the electrical industry, rather belatedly, have attempted to counter the brilliant work of the British Commercial Gas Association, and the British motor car manufacturers have co-operated to fight foreign competition. Not all these campaigns are as well conceived and as carefully carried out as the gas advertising, whose Mr. Therm has become a nationally popular symbol. . . ."

The autumn campaign to publicize the healthiness of gas fire heating was praised by the advertising technical press for the ingenuity with which the message was put over. "Very cleverly designed not only to attract the eye, but to convey the selling idea at a glance," said the *Advertiser's Weekly*.

The spring campaign carried with it an offer of a free cookery book, the result being that about 600,000 copies were distributed. This book—"A Hundred and Twenty Recipes"—was more than a mere cookery book; in effect it was a catalogue in small of domestic gas equipment, for interleaved with the recipes were more than seventy illustrations of modern gas appliances, cookers, fires, water heaters, radiators, home laundry equipment, lighting fittings, refrigerators, and "gadgets."

In connection with this national advertising, it is interesting to learn that enquiries arising as a result of press advertisements and editorial publicity increase each year. The Association is thereby enabled to extend what began as a general appeal into a personal and individual service to each enquirer.

The B.C.G.A.'s advertising in technical and trade magazines broke new ground last year. Each advertisement was based on some notable gas installation and was laid out in the form of an illustrated editorial article. In addition, the booklets issued under the heading of Industrial Uses of Gas were advertised in suitable journals with excellent results. One of this series, "The Heat Treatment of Steel," has aroused considerable interest among engineers and technicians. More than 3,000 applications for copies were received in response to the advertised offer, not only from residents in this country, but from the colonies and abroad. Other issues in this series covered swimming-baths and washhouses and laboratory apparatus.

A large number of undertakings now make regular use of the Association's local advertising service for the preparation of folders, booklets, and leaflets, and of press advertisements. The Association's standard sales literature has also been well received, reflecting as it does many important activities of the Industry. Three issues, for example, in the "A Thousand and One Uses for Gas" series, emphasized possible loads in which considerable future increase may be expected. These dealt respectively with shop heating, domestic science classroom equipment, and with café and tearoom apparatus. A further issue in this series dealt with indoor recreations, another modern activity which should give gas undertakings a chance of obtaining increased business. A "prestige" publication which undoubtedly impressed those members of Parliament and of municipal councils who had an opportunity of seeing it was "Gas and Public Authorities," a pictorial record of the manner in which the work of the Gas Industry and that of local administration runs on parallel lines.

The *Flambeau*, the Association's quarterly propaganda magazine, continues to show a steady increase not only in the numbers of copies of each issue taken by gas undertakings, but also in the number of undertakings making use of the magazine. Since the publication of the first issue in 1932 sales have trebled and the number of undertakings ordering copies has increased by a like proportion. Some distinguished contributors and articles about the homes or activities of various people in the public eye have helped to contribute to the success of this magazine.

The B.C.G.A. Studio has had an increasingly busy year.

Its activities continue to develop in sales service, co-operative schemes, and in an advisory capacity to undertakings. Displays to link up with films, shopping weeks, carnivals, and other local events have been in steady demand. The interchange scheme of displays instituted in 1935 has been amended, and a new scheme inaugurated which has received whole-hearted support from gas undertakings. The poster service to undertakings has been increased, over 1,500 double crown posters now going out from the Studio each month.

Other branches of the Association's activities cover public lectures (particularly useful is the B.C.G.A.'s lecture service to schools and colleges); home service; showroom planning; and salesmen's training. In all these directions much useful work has been accomplished, a new extension of the last named service being a course of training for salesmen in public speaking.

S.B.G.I.

At the Annual Meeting of the Society of British Gas Industries in May, Mr. F. B. Richards was elected Chairman on the completion of Mr. D. M. Henshaw's term of office. In at least one outstanding respect was Mr. Henshaw's Chairmanship notable—namely, that no fewer than 24 firms joined the Society during his year of office. This fact is certainly of considerable importance to the Gas Industry, for it must now be realized that no matter what the subject be, if the views or the assistance of the Contractors and Manufacturers are needed to deal with any of the Industry's current problems, the Society is in an unchallengeable position to speak for them.

The Annual Meeting and Dinner were held in May, and it was unfortunate that indisposition made it impossible for the President, Sir John Cadman, to preside. A most interesting lecture, however, was given on his behalf by Dr. A. E. Dunstan in the afternoon, and at the Dinner in the evening Sir David Milne-Watson, Past-President, presided, the chief speaker being Sir Robert Horne.

The Society has always been fortunate in the distinguished people who have been willing to serve as its Presidents. This year is no exception, and the warmth of the welcome which the members gave Lord Londonderry when he presided over their Autumn Meeting in November left no possible doubt as to the measure of their appreciation of his acceptance of the office. Mr. Richards followed a well-established custom by presenting a Paper at the Autumn Meeting. Entitled "Evolution in the Gas Industry," it was a well-balanced and careful review of affairs in the Industry, and terminated thus: "Cannot the Gas Industry, realizing its responsibilities, plan and evolve without need of outside intervention? Collective action will be necessary, but however far this may eventually go, it is well to emphasize that success depends upon the effort of the individual, for whom adequate scope and incentive must be provided."

With the formation of the British Gas Federation, the Society saw a new position for itself in the Industry, since its co-operation was sought to an extent greater than ever before. It has been a pleasure, therefore, to note the number of occasions and the variety of ways in which the Society, during the past year, has shown in a practical fashion its desire to identify itself as closely as possible with any steps that were being taken to improve the status and further the interests of the Industry. We know there have been some who have doubted the capacity of the Society's members really to pull together and to work in unison through their central organization, but we think that the number of doubters must be diminishing very rapidly, for truth to tell the cohesion of the Society's members in questions of lesser or greater consequence is sufficiently striking for special commendation.

To turn to a few matters of detail. The Society's members are called upon to support a large number of exhibitions, and the activities of the British Gas Federation Exhibitions Committee, on which the Society is strongly represented, are already proving of advantage both to the Society's members and to the Industry as a whole. An important further result is that the attention of all concerned is tending to become more closely focussed on the extent of the contribution which the Society's members make towards the general propaganda work of the Industry. It will be recalled that it was at the pressing request of the Federation that the Society undertook to support the Gas Section at the British Industries Fair, Birmingham, and how strikingly was this undertaking honoured by the Society's members. Whatever thoughts there may be on the subject of this exhibition generally, one fact seems to have been quite universally agreed, that it was the finest show by far which the Gas Industry has put up in all the years of its participation. That the whole effort was sponsored by the British Gas Federation gave it a certain national flavour which, no doubt, added to its general effectiveness. So successful were the efforts of the Joint Gas Conference Committee that gas engineers visited the Fair in greater numbers than ever before, and in fact applications for tickets for the two Official Luncheons were far in excess of maximum capacity. A highly successful Joint Industrial Exhibit was staged, to the cost of which, and of the Information Bureau, the Society made a handsome financial contribution.

Within but a few weeks of the British Industries Fair, manufacturers of appliances were staging a further series of admirable exhibits at the Ideal Homes Exhibition. They showed how well the Industry is keeping abreast of the times both actually and also in relation to other industries competing for the favours of the public.

The Council of the Society, as in previous years, has awarded Silver Medals to each of the Junior Gas Associations for the Paper adjudged best among those presented during the year by members at a general meeting. Prizes have also been awarded in the City and Guilds of London Institute Examinations in Gas-Works Practice, Gas Supply Practice, and Gas Fitting.

The issue of Quota Certificates in respect of certain gas apparatus for importation into France is still being conducted by the Society, though it is gratifying to report, in the interests of British manufacturers, that Quota restrictions on burners were removed in the early days of October.

The Society has established closer working arrangements with the British Standards Institution and the Federation of British Industries, and in particular with the Contracts Committee of the latter body. It has two representatives on the Executive Committee of the Women's Gas Council.

The Society's subscription to the British Commercial Gas Association has been maintained, but more important perhaps is the noticeably closer working understanding between the two bodies. There are so many ways in which benefit can be derived from closer co-operation between these two bodies that every move in this direction is a positive gain for the Industry.

What may be said of co-operation between the B.C.G.A. and the S.B.G.I. may be said of co-operation with every national body and every national effort in the Gas Industry. The Society is to be congratulated on a successful year, and its members, we believe, derive no small satisfaction from the fact that their organization is showing signs of robust health and increasing activity. It augurs well for 1937.

Technical Development

Regarded from the aspect of technical development the year has been one of more than usual interest. Most important of all, we think, is the change in policy in regard to research. Actually, two changes have taken place. We have reached the end of an era when rapid strides were made in the technical efficiency of gas manufacture and utilization. Interests are to be concentrated on questions of quality, utility, and economy of labour rather than on mere thermal efficiency. A few years ago the thermal balance-sheet was the central feature of many of the Industry's researches. It has now been realized that the staff working for the Research Executive Committee of The Institution of Gas Engineers need no longer examine existing established methods, and that they may be employed more profitably investigating new problems. A much longer view is being taken, and it is obvious that the Committee now holds a much more courageous belief that the Gas Industry is more research-minded. Work is to be carried out at Leeds University on the question of gas quality in relation to utilization; and this work now links up directly with other work to be done on gas manufacture

by the Institution. The latter investigation is concerned with what new processes of manufacture in five, ten, twenty, or thirty years may become practicable. At the same time we need information as to how the new type of gas, whatever it may be, is going to affect, as it will affect, the utilization problem.

In regard to manufacture much interest has centred on the process for the complete gasification of coal with oxygen under pressure. This subject is being investigated by the Joint Research Committee of the Institution and Leeds University. This interest has been aroused by recent experiments in Germany which have shown that when the gasification in a mixture of steam and oxygen is effected at pressures of 20 to 30 atmospheres a gas is obtained which, after removal of carbon dioxide, is comparable with town gas in composition, specific gravity, and calorific value. Furthermore, the possibility of using oxygen has been increased by the recent development of the Linde-Fränkl process for oxygen production, whereby oxygen may be manufactured in quantity at materially reduced cost. The use of high pressure, while primarily considered as an aid to methane synthesis, is also accompanied by other advantages. High pressure favours the formation of carbon dioxide in preference to carbon monoxide and reduces the oxygen requirements of the process. The carbon dioxide can be readily removed from the gas while in a highly compressed state by simple scrubbing with water. The purification of the gas is simplified, for this washing with water also removes some 90 to 95% of the hydrogen sulphide at the same time. Another advantage is that the ground space occupied by the generator and purification plant is greatly reduced. During the year we have had much information, too, concerning the Fischer-Tröpsch process for the production of petrol, fuel oils, and lubricating oils from coke. The process is undoubtedly one of extraordinary flexibility and is of direct interest to the Gas Industry.

Carbonization of Cannel

Another important feature of 1936 in regard to manufacture has been publication of the results of the joint investigation on the carbonization of cannel by the Edinburgh Gas Department and the Fuel Research Board. This work affords an outstanding example of the great value of such collaboration, and is probably the most complete which has been made on the carbonization of cannel. The crude oil produced ranged from 41 to 54 gallons per ton of cannel carbonized, and in addition over 5 gallons of crude motor spirit, typical of that recovered from a low-temperature carbonization process, were obtained by stripping the gas. The yield of gas varied according to temperature and steaming conditions from 95 to 125 therms per ton, the yield of coke from 9 to 8 cwt. The investigation at Edinburgh has demonstrated that certain grades of cannel once so widely carbonized can be used again with profit in the Gas Industry. Regarding the economics of the process, under the conditions at Edinburgh and with the particular type of cannel investigated, the gas costs less to produce than that from Scottish gas coal, and if the tar could be sold for hydrogenation purposes the cost of production of the gas could be as low as 0·5d. per therm. It has been estimated during the year that the reserves of Scottish cannels containing less than 8% of ash and yielding over 40 gallons of crude oil per ton amount to 25,500,000 tons, and that the reserves of cannels containing more than 8% ash and yielding over 40 gallons of crude oil per ton are 51,700,000 tons. The suggestion has been put forward by the Scottish National Development Council that the matter is of such importance that it should be the subject of a conference of the Commissioner for the Special Areas in Scotland, and representatives of the Oil from Coal Committee of the Council, the coalmasters of Scotland, the Gas Industry, the Minister for the Co-ordination of National Defence, the Mines Department, the Fuel Research Board, and H.M. Geological Survey.

The question of "controlled cracking" of the gases evolved from coal on carbonization has continued to be discussed, and in this connection the Paper which Herr W. Allner presented at the Chemical Engineering Congress of the World Power Conference in London last June is of great interest. This Paper was concerned with the carbonization of brown coal, but the process described may give impetus to the study of the use of parallel methods for dealing with non-coking coals in this country. The process described by Herr Allner embodies the principle of the controlled cracking of hydrocarbons in the presence of hydrogen. The coal is briquetted and is charged in the ordinary way into continuous vertical retorts, the temperatures used being of the order of 1,000° to 1,300° C. The residual coke is mechanically and continuously discharged into a producer for heating the setting. Instead of allowing the products to travel upwards and out at the top of the retort as is usual in verticals, the outlet is so arranged that the volatile products are compelled to travel downwards a certain distance in the same direction as the charge. At the same time the retort is steamed in the usual way. The heat treatment given to the products converts the gas into the right composition with the exception of too high a carbon dioxide content, which is scrubbed out.

There has been a good deal of progress in low-temperature carbonization during the past twelve months, which have witnessed an increasing public demand for low-temperature smokeless fuels. We have referred in the "JOURNAL" to the new works of Low Temperature Carbonisation, Ltd., which started production at Bolsover in November last. At the general meeting of the Company last week a very satisfactory state of affairs was reported. We have given a description during the year to a new process introduced by the Coal Research Syndicate for the production of smokeless fuel from non-caking coals. In this process the principle of internal heating is employed.

Sulphur Removal

At the Autumn Research Meeting of The Institution of Gas Engineers work was reported on two pressing problems —gum formation in gas and the question of the elimination of sulphur compounds. In regard to the latter problem, the communication showed that sulphur, from a practical and economic point of view, can to a large extent be removed. It was concluded that processes already exist whereby the sulphur content of town gas can be reduced to 10 gr. per 100 cu.ft. Two of these processes—the active carbon process for benzole recovery operated by the Gas Light and Coke Company, which removes the thiophen and some of the carbon disulphide, and the catalytic process of the South Metropolitan Gas Company, which removes the carbon disulphide and little of the thiophen—have been thoroughly tested and proved successful in large-scale operation. A modification of the normal oil washing process for benzole extraction has been developed by the Gas Light and Coke Company whereby the sulphur content of town gas should be economically reducible to less than 10 gr. per 100 cu.ft.; and an all-round reduction of the sulphur content of town gas to 10 gr. per 100 cu.ft. has been strongly recommended. The hope has been expressed strongly in several quarters that 10 gr. per 100 cu.ft. should by no means be regarded as a satisfactory minimum. In regard to the gum problem, it has been made clear that gum deposits are due to interaction between small quantities of nitric oxide, oxygen, and certain unsaturated hydrocarbons. Most of the nitric oxide in coal gas is due to waste combustion gases drawn into the retorts from the heating flues, or to air drawn in at the retort mouthpieces which burns inside the retorts. The importance has been emphasized, therefore, of pressure governing in the retorts and the maintenance of tight retorts and retort fittings. The conclusion has been drawn that, until such time as there is an economic method of removing nitric oxide from the gas, the holders must be regarded as having two functions in addition to that of storage. They must be regarded as reaction chambers in which the small quantities of nitric oxide in the gas react with unsaturated hydrocarbons and oxygen to form gum, and as chambers in which the gum so formed settles from the gas. Time must be allowed for such settlement to take place; and it has been found that gum particles settle at a greatly increased rate if the gas is in such a state that moisture is condensing. The Report on the problem stated that it may be necessary to add live steam at the holder inlet in hot weather in order to promote saturation and subsequent condensation. For these reasons gas drying plant should be installed at the outlet of gasholders. Recent improve-

ments in gas washing appliances have provided types of plant which will operate economically with wide variations in gas load and with very small loss of pressure. It has been shown that adequate storage of gas in holders having the inlet and outlet pipes far removed is advantageous. Distribution of a mixture of stored and unstored gas is particularly objectionable.

During the year the results have been reported of investigations into the alkali activation of cokes carried out by Imperial Chemical Industries. It has been found that in ordinary coke containing from 5 to 10% of ash the acidic constituents of the ash combined with the sodium carbonate added, and consequently a considerable portion of the sodium carbonate was put out of action as far as any activating effect was concerned. It has also been shown that if a mixture of lime and sodium carbonate was added before carbonization the lime combined preferentially with these acidic constituents, leaving the sodium carbonate free to activate the coke. It was possible to obtain the maximum activity using lime *plus* 0·5 to 1% of sodium carbonate. Moreover, less lime than sodium carbonate is needed to neutralize the acidic constituents, and therefore the total addition of lime and sodium carbonate is less than sodium carbonate alone. Again, lime is much cheaper than sodium carbonate, and the possibility of alkali attack on the refractories of carbonizing plant is reduced. These considerations should make a great deal of difference to both the economic and the practical application of alkali activation. As far as the I.C.I. investigation has gone the conclusion is drawn that with the more reactive coals it should be possible by alkali activation to make reactive cokes in vertical or horizontal retorts, and " possibly even in coke ovens," under normal carbonizing conditions provided the coke is not over-coked. With less reactive coals alkali activation in vertical retorts should give the required reactive coke under normal conditions, but in horizontal retorts and in coke ovens some additional means of increasing reactivity will probably be necessary. The two obvious methods are under-carbonizing and blending. The production of cleaner coals will, of course, materially assist the application of alkali activation, for the process inevitably increases the ash content of a coke. To produce a coke of not more than 6% of ash, it is necessary, where alkali activation is used, to start with a coal of not more than 3% of ash. As to the likely cost of the process, assuming that 0·5% of sodium carbonate and 1% of lime on the coal are necessary, the cost should be about 1s. 3d. per ton of coal, or about 1s. 8d. per ton of coke. If 1% of sodium carbonate is necessary, the cost will be about 2s. to 2s. 5d. per ton of coke. If clean coal is used, the cost of cleaning will be offset by the decrease in the lime required.

Experiments which have been carried out by the Liverpool Gas Company on the activation of cokes have also been described during the year. These experiments have been conducted on both a horizontal test plant and on normal vertical coals in large-scale vertical retorts, the most consistent results from activation having been obtained in the vertical plant. In any case, the results obtained are most encouraging, and there is no doubt that the method can be used to increase the production of free-burning domestic fuel with the high-temperature carbonizing processes used by the Gas Industry. The question of the effect of the added alkali on the refractory will have to be determined by experiments over a period of at least twelve months; and as a matter of fact this is being done. Apparatus has been installed on a vertical retort which enables alkali to be added in proportion to the flow of coal. The retort will then be compared with others working under similar conditions without alkali addition.

Early in the year we published a communication from the South Metropolitan Gas Company's Coal Laboratories at Newcastle-upon-Tyne concerning the moisture content of coal and its relation to other properties of the coal. The moisture of coal is customarily classified as that removed by air drying and that not removed by air drying—" free " and " inherent " moisture. Tests devised to give this differentiation are carried out under variable conditions of humidity and temperature and give figures of no obvious constancy or relation to other analytical data. In the experiments it has been found that the amount of moisture retained by a coal under controlled conditions is, generally speaking, a function of its fixed carbon content, and for a large proportion of the coals tested it is possible, after drying under specified conditions, accurately to predict the moisture content. It has been further discovered that this moisture content is also closely related to the swelling power of a coal; and if the swelling property is regarded as an index to the coking qualities of a coal, it follows that this moisture determination can also indicate the coking values of some coals. The conclusion has been drawn that the moisture content of a coal after drying under specified conditions depends fundamentally on its rank. Turning for a moment to the industrial uses of gas, 1936 has proved a good year—thanks largely to the work of the Industrial Development Centres and of the research departments of individual undertakings. To typify this we may refer to work of the Sheffield Gas Company the results of which we have published during the year. The Company has carried out research into the action of gases on non-ferrous metals, particularly nickel silver, sterling silver, and copper, with a view to producing furnaces for the bright annealing of these metals in their various forms, and has been successful in putting into use in the Sheffield area eminently practical and economical installations. The Sheffield investigation showed that the products of perfect combustion of town gas can be used to give perfectly bright annealing of sterling silver, that pure copper can be equally successfully bright annealed in the same products of combustion, and that the furnace and process used for sterling silver are equally applicable to the annealing of nickel silver, except that in practice a certain amount of excess gas in the products of combustion is required. The metal can now be annealed in a furnace without a muffle; and as no external additional supply of purging gases is required, the cost of the process is confined to the cost of heating the metal. A great deal of work, with a successful outcome, has also been done in the application of gas to the heat treatment of high-speed steels.

The foregoing references to some of the technical developments in the Gas Industry in 1936 can only serve as a pointer to the increased activity which has manifested itself to such good purpose and which has made the outlook of the Industry so much brighter. Even a pointer, however, would be incomplete without mention of the opening of the Gas Light and Coke Company's new Watson House in Fulham at the beginning of this month—the purpose of which is to provide, with the co-operation of the appliance makers, apparatus which will ever give the consumer better satisfaction, and to serve as a training centre to ensure that this apparatus will be installed efficiently in all respects and used by the consumer to the best possible advantage.

Public Lighting

A gratifying feature of the latest Board of Trade Return relating to all authorized gas undertakings, published in November last, is a record figure for sales of gas to local authorities for street lighting purposes—over 13,000 million cu.ft. The Return is for the year 1935, but there is good reason to believe that the steady increase which has been a feature for so many years will be maintained in 1936. Early in the year the Borough of Camberwell decided to change over its public lighting to electricity, in spite of the fact that for more than a century the South Metropolitan Gas Company had unfailingly carried out the public lighting with ever-increasing efficiency, and in spite of the fact that the Company to-day is equipped better than ever to fulfil all modern lighting requirements. The Camberwell decision was arrived at not on grounds of technical efficiency; it was an affair of politics, nothing more or less. For the same reason other reverses have been sustained in some quarters. Against this, however, there have been very many renewals of long-term contracts for improved gas lighting. An example is the award to the South Metropolitan Company of a five-year contract for the re-lighting of all the streets in the Borough of Wandsworth which lie within its area of supply—a scheme involving 106 miles of street. Other undertakings have entered into contracts for a period as long as fifteen years.

A satisfactory feature of 1936 was the large attendance of delegates from the Gas Industry at the Conference of the Association of Public Lighting Engineers. From the point of view of exhibition lighting, however, gas by no means

had a commensurate showing, in spite of the efforts of the manufacturers of gas lighting equipment and the wonderful floodlighting by gas of buildings and gardens. At the Conference one of the Papers, by Mr. F. C. Smith, of the Gas Light and Coke Company, and his colleagues, dealt with kerbline visibility—a most important factor which makes for safer driving at nights. It was suggested that it may be possible to incorporate in a street lighting specification some requirement as to kerbline visibility; and that it would be well, in view of the high contrast values experience has shown to be necessary to reveal the kerbline in the last three classes of the British Standard Specification, if in these classes the maximum kerbline visibility could be promoted by restricting the lamp positions to kerb mounting as far as possible. In any case, it has been shown that good kerbline visibility may be obtained by relatively simple means which are compatible with the requirements of both driver and pedestrian.

In the Interim Report of the Departmental Committee of the Ministry of Transport the suggestion was made that in regard to the mounting of lamps there should be an overhang of 6 ft. from the kerb, and some lighting and municipal engineers seem to regard such an overhang almost as an essential. Work during the year has shown that the high mounting height and large overhang appear to be associated with dependence upon specular reflection for visibility in the road surface brightness brought about by the mercury vapour lamp. But along with specular reflection there can be almost complete invisibility of the kerb itself. With such an overhang, in wet weather there is a black lane bordering the footpath, and in that lane one cannot see a cyclist, or a pedestrian stepping on to the road. There can be no question that the suggested overhang of 6 ft. put forward in the Ministry of Transport Committee's Report will have to be reviewed in the light of work which has been carried out since its publication.

The question of national defence has, of course, been to the fore in 1936, and this involves consideration of methods of protecting the civilian population, as well as our cities, factories, and other assets against air raids. Public lighting authorities have been asked in the course of an investigation how quickly they could extinguish their lighting systems, should this be necessary, on the report of an approaching attack from the air. The electricians seized upon this as an opportunity for a hit against gas, and in certain instances endeavoured to persuade local authorities and public lighting engineers that, without any fuss or bother, the whole of an electric lighting system could in such an event be cut off immediately. As a matter of fact, this is by no means such a simple affair as the electricians would have local authorities believe. Local authorities were led to assume by the electricians that, with gas for street lighting, a considerable period of time must elapse between the report of an air raid alarm and all the public lamps being extinguished. Should it become essential to have simultaneous and immediate extinction of public lighting our Industry could fulfil this requirement. During the year developments have taken place in the perfection of suitable "air raid valves" for incorporation—should it be deemed desirable by the Government—in public gas lamps. From a safety point of view in the event of air attack, public lighting by gas is in no way inferior to public lighting by electricity.

Apart from street lighting, the year has witnessed several vast improvements in the lighting by gas of railway stations.

Coal

During the year 1936, the vital subject of coal has been prominent in all the deliberations of the Industry. Since 1930 the coal industry had been dominated by the machinery imposed upon it by the Coal Mines Act, 1930, which inaugurated the policy of quotas and minimum prices, against which the Gas Industry and other large consumers of coal have never ceased to protest. In 1935 there was ample evidence that the Government had decided that a more rigid application of that policy was necessary if the coal industry was to be placed upon a satisfactory basis, and that the Coal Schemes authorized by the Act would require revision, particularly with a view to the elimination of competition between districts and recalcitrant coal owners within the districts. The introduction of the Lancashire and Cheshire District (Coal Mines) Scheme (Amendment) Order No. 2 in 1935 was regarded by the public utilities of the country with considerable apprehension.

No review of the coal position in 1936 would be complete without reference to this important scheme, which has so greatly influenced the coal industry throughout the past year. The scheme introduced the principle which was in 1936 to be adopted throughout the country, whereby the control of coal buying and selling in any district was vested in the District Coal Board, which consisted entirely of the representatives of the coal owners of the district. The Coal Board, by the elimination of all competition, was constituted the sole selling agency for the district, and thereby secured what can only be regarded as a statutory monopoly.

It is interesting, in view of later developments, to recall that Lord Mount Temple, who as President of the Conjoint Conference expressed the apprehensions of public utilities to the merits of this Order, was informed by the Government spokesman in the House of Lords that there need be no fear that the Scheme would be regarded as "a sealed pattern scheme, and so made of general application."

Still more ominous, however, was the coal position as the year 1935 drew to a close. The Miners' Federation made an application for a flat rate increase of 2s. per shift for all mine workers in all parts of the country, and this application was supported by the pledge of the Council of the Trades Union Congress to afford the "maximum assistance to the Miners' Federation in its efforts to raise the standard of miners' wages." In consequence of the pressure upon them to increase the wages of mine workers, communications were addressed by colliery owners to gas undertakers, suggesting that they should agree to an increase of 2s. per ton on all existing coal contracts. Such a request led naturally to negotiations between the Gas Industry, the Government, and representatives of the coal owners; and these negotiations were followed in the early part of January by a special meeting of the Central Executive Board of the National Gas Council. The Gas Industry was faced with the serious prospect of a strike in the coal industry, which would inevitably entail disastrous consequences to the nation, and also with the fact that many of the larger consumers had already consented to some voluntary increase in contract prices.

The National Gas Council therefore decided to recommend a voluntary increase of 1s. per ton upon the prices specified in existing contracts subject to certain conditions and safeguards. An undertaking was also obtained from the coal owners that in consideration of the voluntary increase they would be prepared to discuss certain grievances of the Gas Industry. The recommendation of the Council in favour of the voluntary increase received an overwhelming response on the part of the Industry. It was not unnatural that the voluntary increase in coal prices should raise the question as to whether some increase in the price of gas ought not to be made, and during January a small increase was announced by several of the larger undertakings. An advance in the price of coke was general throughout the country.

At the beginning of the year it became evident that the Government were determined to enforce a monopoly in the selling of coal and to insist upon such amendments of existing coal schemes as would ensure the elimination of inter-colliery competition and the cessation of every evasion by individual coal owners.

It also became apparent that the Government did not contemplate that any adequate form of protection for consumers, who might be detrimentally affected by these wide monopolistic powers, would be necessary. In February it was reported that the Commission set up under Part II. of the Coal Mines Act, 1930, for the purpose of bringing about the amalgamation of coal mines were not able by voluntary means to achieve that end; it was therefore announced in the House of Commons that the Government proposed to introduce legislation to confer upon the Commission powers of compulsion. The position was rapidly becoming so serious that it was thought to be necessary forcibly to impress upon the Government the grave apprehensions felt by all the public utility organizations of the

country; for this purpose a strong deputation of the Conjoint Conference, led by Sir David Milne-Watson, waited upon the Secretary for Mines in April to state the fundamental objection to the whole policy of the Coal Mines Act, 1930, and to demand adequate protection for consumers.

The attitude of the Government remained entirely unconciliatory, and it was thought necessary that the Conjoint Conference should bring to the notice of Members of Parliament and to the public generally the nature of their objection to the coal policy of the Government. It was emphasized that in the case of gas, electricity, and water undertakings statutory privileges were conferred only as an ancillary part of corresponding statutory obligations such as would ensure the ample protection of the consuming public. The coal selling Boards, on the other hand, would be restricted by no such obligations; the coal consumer would have no right to demand coal of the quality best adapted to his requirements; he would have no power to object that other coal consumers, with whom he might be in competition, were receiving undue preference, and no means of obtaining access to the figures which alone would enable him to appeal to one of the Committees of Investigation. It was therefore imperative that an effective tribunal of appeal should be established, to which an aggrieved consumer could apply for speedy justice, and which would have the power to give an effective decision binding upon the parties.

The existing Committees of Investigation had never gained the confidence of the coal consuming public in general or of the public utility organizations in particular. In actual fact no public utility undertaking in the country had ever deemed it worth the time and trouble to take a case before such a Committee.

Negotiations with the Mines Department continued throughout the month of April, but no concession of any value was forthcoming, and it was with considerable surprise that the Industry learned in May that a new Coal Mines Bill had been introduced by the Government for the purpose of (*a*) strengthening the powers of the Coal Reorganization Commission for enforcing amalgamations of collieries, and (*b*) continuing until 1942 those provisions of the Coal Mines Act by which the system of quota and minimum prices was authorized. The Bill was, however, so drafted that it would not have been possible for a Member of Parliament to move amendments relating to the composition and procedure of Committees of Investigation. It was therefore necessary for the National Gas Council to take steps to oppose the Bill, and it was soon apparent that opposition to the Bill in other quarters, particularly on the part of the colliery owners themselves, was exceedingly strong. The Government having attempted an eleventh hour amendment on second reading, decided to withdraw the Bill and to re-introduce it in a modified form after the summer.

At about the same time seventeen draft Orders, one for each coal district, were laid upon the Tables of both Houses of Parliament and would become law, unless opposed, within twenty Parliamentary sitting days. These Orders, although somewhat different in detail, resembled each other in that each set up in the district to which it related a monopoly of coal selling in the hands of the owners and afforded no protection of any kind to the coal consumer. In these circumstances it was imperative that some action should be taken by the Gas Industry to bring to the attention of the public the serious danger which threatened the Industry. It was therefore decided that the unprecedented step of calling an Emergency General Meeting of the British Gas Federation should be adopted. The organization of the Federation was, of course, well adapted to demonstrating the solidity of the whole Industry in support of the demand for adequate protection against the monopolistic rights of the coal owners.

The Meeting was held at the Central Hall, Westminster, on May 26, and some 1,500 representatives of the Gas Industry were present, and at the conclusion a resolution was passed demanding that provisions for the adequate protection of coal consumers should be introduced into the monopoly schemes which were now being prepared; that in particular there should be an obligation to supply coal of a quality reasonably required by the consumer; and that impartial and independent tribunals with effective powers should be set up in each district, to which aggrieved consumers could appeal.

The effect of this Meeting was widespread and beneficial in many ways. *The Times* in a leading article strongly supported the plea, made by Sir David Milne-Watson from the Chair, for the adequate protection of coal users. Town Councils throughout the country passed resolutions and called upon their Members of Parliament to oppose the making of the monopolistic coal schemes. Similar steps were taken by gas companies. Of the greatest assistance was a resolution passed by the Association of Municipal Corporations at a special meeting convened to consider the position. But in spite of all, the attitude of the Mines Department until the second half of June remained unchanged. Then, however, the Government, alarmed by the effects of the propaganda throughout the country, announced that they would include in forthcoming legislation provisions to the following effect:

(*a*) That the existing Chairmen of the Committees of Investigation should be superseded by independent Chairmen of legal qualification.
(*b*) That where the members of the Committee were not unanimous, the independent Chairmen should make the decision on behalf of the Committee.
(*c*) That the decision of the Committee should thereupon become binding upon all the parties.

The effect of these concessions would be to constitute the Committees as Independent Tribunals capable of giving immediate and effective decisions upon any matters submitted to them. This assurance was accepted by the Industry as affording reasonable satisfaction to their demands.

It will perhaps be useful to conclude this review of the coal position in 1936 by giving a brief summary of the nature of the Coal Schemes which have now come into operation.

The Central Coal Scheme has been amended so as to enable the Central Coal Council effectively to prevent competition between the various districts. The amended schemes of the seventeen coal districts into which the country is divided vary in detail, but each contains provisions whereby the control of all coal sales is vested in the District Coal Board. The form of control may be classified under three heads, as follows:

(*a*) Schemes which constitute the District Executive Board as the sole buying and selling organization of the district. There is an obligation upon every colliery owner to sell all his coal to the Board, and no coal may be sold to the consumer except by the Board. Four schemes contain provisions of this type —*i.e.*, those of the Forest of Dean, Shropshire, South Staffordshire, and Lancashire and Cheshire.
(*b*) Schemes which provide that sales may be made by colliery owners only by the permit or consent of the Board, either acting by itself or through a Sale Committee. There are eleven schemes of this type.
(*c*) Schemes, such as those of the Midland Amalgamated District and the Scottish District, which are of a somewhat more complicated character.

By the Midland Scheme the district is divided into five sections, which are again sub-divided into groups. Selling agents act for each group, and the various groups in a section are co-ordinated by a Sectional Co-ordinating Committee. These Committees are in their turn controlled by a District Co-ordinating Committee. Somewhat similar provisions are contained in the Scottish District Scheme. Each of the 17 schemes prescribe that each colliery owner is entitled to a certain share of the trade of the district, known as a Trade Share, ascertained in the manner specified in the Scheme. If a colliery owner does not sell his Trade Share he is entitled to obtain compensation from the District Board. Similarly he is under an obligation to pay a contribution to the Board if the amount of his Trade Share is exceeded. The amount of the compensation or contribution is usually fixed at 2s. 6d. per ton.

This review has indicated that the problem of the coal industry has been greatly to the fore during the past year. The Government have not yet introduced the legislation

which has been promised, but such legislation will be essential in the near future in order to extend the period during which Part I. of the Coal Mines Act is to remain in operation. Already the legal and impartial Chairmen of the Committees of Investigation have been appointed. The importance of the Gas Industry in national life has been emphasized, and the contest of the Industry for adequate protection as large consumers of coal has met with unqualified success.

Coke

So far as the coke market and coke selling activities generally have been concerned, the past year has been one of great interest. It has marked a period of intense activity in the steel industry which has had its repercussions upon the Gas Industry's coke markets consequent upon the withdrawal of some million and a half tons of furnace coke during 1936. In 1935 there was a surplus of furnace coke amounting to 3,289,000 tons which was sold in the domestic and industrial markets served by the Gas Industry. In 1936 that figure fell to 1,800,000 tons. The Gas Industry has been able to make up a little of this withdrawal by increasing its gross production since 1934 by some 351,000 tons. It has, however, at the same time, been essential—from the National viewpoint—for the Industry to maintain its export market at a reasonably stable figure; and of the 2,500,000 tons per annum for the next three years, as fixed under the new Cartel quota, about 820,000 tons represents gas coke. Agreement in connection with this quota is likely to be reached in the near future, and its sub-division is made up as follows: Germany, 48·5% (equivalent to 5½ million tons); United Kingdom, 21% (2⅓ million tons); Holland, 18% (2 million tons); Belgium, 9·5% (1 million tons); and Poland, 3% (400,000 tons). Prices are also being fixed by the Cartel in this connection.

It is the amount of coke for sale, however, which concerns the market in this country, and this total has increased by 642,000 tons in comparison with the 1934 figure, which would include a portion of the 100,000 tons imported through the agency of some of the London gas undertakings. It is expected that the total coke imported during the year now closing will reach the 150,000 tons mark, and this amount is being applied as follows: 70,000 tons to gas-works for producers, water gas production, and steam raising; 35,000 tons to unclassified industries; 15,000 tons to horticultural industries; and the remaining 30,000 tons to the iron and steel trades. It is clear, however, that this importation does not by any means entirely offset the shortage, which may be felt even more severely if we experience a cold winter. In spite of all the additional provision which has been made the shortage still amounts to 1,489,000 tons. Nevertheless, it should be appreciated that the 70,000 tons which is going into the gas-works will release an equivalent quantity of good gas coke for our domestic markets, which is a wise development in view of the fact that this market is so highly specialized in its requirements of both uniformity and quality.

It may well be asked why, with this unprecedented demand for furnace coke by the steel industries, there are still 1,800,000 tons of that product coming into the gas coke markets. The answer lies in the fact that a considerable number of coke ovens have in the past supplied fuel for the domestic market, and their coke is not suitable for the steel industry's requirements. The demand of the domestic market has considerably increased even during the past twelve months and is now practically beyond the available supplies, notwithstanding the fact that a distinct change has taken place in the character of coke supply in the last five years whereby the transfer of 20% of the Gas Industry's coke business to this market has been effected. The gross quantity, however, remained the same, so that this 20% could have represented a complete increase had the fuel been available to fill the demand of the domestic market.

Since 1925 the total production of coke in Great Britain by the Gas Industry and the coke oven industry has been in favour of the former, with the exception of the year 1929. But in the past year the production of the coke ovens has passed that of the Gas Industry, and if the demand of the steel trade is maintained at its present level they will continue to increase their lead each year. Coke oven coke is, in ever-increasing extent, entering the domestic and quasi-domestic markets; but pig iron production has jumped so vastly—by 2 million tons in the past two years—that the coke oven interests have not assessed the demand in proper ratio or in sufficient time to enable them adequately to meet it when it arose. Indeed, the most sanguine estimate would not have conceded that there could have been so large an increase in the demand in so short a time. The coke oven industry has been going through a long period of depression, during which its capacity to appreciate future possibilities had become somewhat dimmed; outlook had, perhaps, become pessimistic—all of which militated against a proper recognition of the situation. The result has been that in 1936 the coke oven industry had a small surplus over the requirements of the iron and steel industries; but this was a "paper" surplus only, and did not indicate its existence in districts where it might be needed for the service of the steel trade or that it might be of suitable quality for blast-furnace work. If the existing surplus had been of suitable quality and available in the areas where it was required, then the general markets into which it has been sold would, in all probability, have been completely denuded of this supply.

Experience has shown that it is not good policy to denude markets in this way, because they all subsequently have to be rebuilt. Had there been adequate co-operation this difficult situation would not have arisen to the same degree. The whole position emphasizes the urgent necessity for a policy of co-ordination throughout the coke oven industry. That this need has to some extent been realized is evident from the recent formation of the Coke Producers' Federation, and it is essential that the Gas Industry, wherever practicable, should enter wholeheartedly into such schemes, either by associating itself with existing organizations or by forming district selling schemes for itself, as, indeed, the past year has witnessed in several important areas—notably in Birmingham, in Newcastle, where the North-East Coast Coke Producers' Association has been formed, in Manchester, where consideration is being given to the formation of the nucleus of a Coke Committee, and in other districts. But in every case experience points to the necessity for close co-operation between the two chief producing industries if the scheme is to be successful.

Coke markets are likely to be short during the coming year, and conditions will not be easy in any European producing country, although figures show that in the general world recovery Great Britain holds the most favourable position. In spite of this anticipated shortage, however, there should be no actual hardship, and while under existing conditions there would be every excuse for a considerable increase in the price to the consumer it would not seem good policy that the opportunity be taken to exploit the situation. The fact that there will be no exploitation in price is due in large measure to the control exercised by such organizations as the London and Counties Coke Association, which has continued to set its policy with a view to retaining stability of price so far as lies within it power. An important factor in this connection is the full co-operation of the distributing side, and a valuable step has been taken during the year by the L.C.C.A. in this direction by the formation of a Coke Distributors' Branch. Membership of this Branch is open to every distributor of coke within the Association's area, and on becoming a member he is entitled to purchase and trade in associated coke. The advantages of such a scheme in maintaining a proper supervision of markets and price are, of course, obvious, for a strict maintenance of control will provide an adequate safeguard to the consumer who, otherwise, under existing conditions might be exploited. Already more than 3,000 distributors have enrolled as members of the Branch.

The industrial and domestic markets will require progressively more and more coke, which will have to be supplied by the by-product coking industry because it is clear that the production of the Gas Industry cannot be materially increased above the present figure. It is advisable that the coke oven interests should extend into these markets—but only if they can come forward with a properly co-ordinated policy, so formulated that their production and distribution are regulated along the following lines: First, they should cater initially and adequately for the blast furnace; secondly, when that demand is satisfied

(which at present it is not) they should provide for the maintenance of their export market; and only when both these functions have been fulfilled should they attempt to enter the domestic market.

The L.C.C.A. has done much during the past twelve months to develop outlets for furnace coke with a view to easing future conditions. Among these may be mentioned its use in agriculture for grass drying, in horticulture for glasshouse heating, soil warming, and orchard heating, and for other purposes which have stimulated considerable interest. Coke-burning appliances have also maintained their steady output progress, and there has been no reduction in the appliance trade—in fact, increases have been general. But it should be mentioned that no sales pressure has been brought to bear upon the domestic market; the L.C.C.A., for example, has undertaken no advertising during the year on behalf of the open coke fire, because it was appreciated that the result of any such publicity would undoubtedly cause embarrassment to the producers in endeavouring to supply the increased demand for domestic coke which would arise. The Association has, nevertheless, carried out useful propaganda in other spheres, both by the presence of its displays at various national exhibitions and by the production of a number of excellent brochures dealing with specific applications of coke. It is also interesting to note that the utility of co-operative working as evidenced by the L.C.C.A. has been recognized by the renewal of the agreement to continue its activities for a further period of five years. For the first two years of its existence the Association carried on with no more security than was provided by an annual tenancy. Then it established itself by universal agreement for a term of three years, which expires at the end of next June. The resolution to remain together for another five years under the new agreement, therefore, indicates a unanimous confidence in the future of the Association, together with a recognition that it now constitutes an integral part of the Gas Industry's activities in this area.

The work of the Association has grown to such an influential degree that it has been found advisable to provide means for its activities to be extended. The previous rate of subscription of 1d. per ton of coke sold hardly brought in sufficient funds to enable this to be done, and those who have already experienced the great advantages which have accrued from membership could not contemplate any curtailment of the Association's activities. The resolution which was unanimously agreed to at the recent Annual General Meeting whereby the Central Committee was given power to call up an additional 1d. per ton, making a total possible contribution of 2d. per ton, will therefore be generally welcomed. Even so it is recognized that the subscription represents a very good investment and is commensurate with the advantages gained by membership. It is understood, however, that only ½d. of the additional contribution is likely to be asked for at the present juncture, this amount being deemed sufficient for the immediate needs consequent upon the expansion of its work.

As a final word on the sales side it may be mentioned that the Coke Salesmen's Circle has maintained steady progress throughout the year in its valuable work of providing a better understanding of the important subject of coke selling; and as a means of providing a greater recognition of its functions the Circle has recently been constituted upon a proper basis, with powers to manage its own affairs through an elected chairman and committee, though still retaining its useful link with the parent body which was responsible for its formation two and a half years ago, and has ably supported it throughout.

An interesting innovation in coke selling has been adopted during the year by the Oldham Gas Department in connection with the introduction of their new two-part tariff. This scheme is directed along lines which have been advocated by coke salesmen in many quarters for a long time past—namely, a tariff whereby consumers who undertake to use only gas and coke for heating are to receive a reduction of 5% on the current price of coke. Others who do not take advantage of the new tariff can secure a similar reduction in the price of gas and coke by giving the same undertaking. The argument advanced in favour of this scheme is that a consumer of gas who uses 30,000 cu.ft. has had approximately two tons of coal used for its production, resulting in the production of about one ton of coke for sale. If the consumer buys this ton of coke at yard price his gas has been produced possibly 2d. or 3d. per 1,000 cu.ft. cheaper than that for another consumer who leaves a surplus in the gas undertaking's yard. Whatever the method adopted, the idea of linking up gas sales with coke sales appears to offer considerable promise, and should have a strong appeal among coke salesmen.

Altogether coke marketing progress during the past year stands out as a record of achievement; but it also shows above all the urgent necessity for co-ordination with a view to protecting and developing the markets of the future.

By-Products

Turning now to by-products in 1935, we would mention first that the report of the British Sulphate of Ammonia Federation for 1934-35 showed a considerable increase—namely, 14%—in the various forms of nitrogen produced. Despite this, the synthetic ammonia plants only operated at an average of 43% of capacity during the year under review. The world productive capacity for synthetic nitrogen is of the order of 3½ million tons. The production of by-product sulphate of ammonia has continued to increase gradually. Home prices for sulphate of ammonia have remained the same as last season. An increase of price was hardly to be expected, in view of the undertaking given to the National Farmers' Union in August, 1935, when the import duty of £4 per ton was imposed on all sulphate of ammonia entering the country. Next season's prices should be more favourable. The cost of the manufacture of sulphate of ammonia at gas-works and coke ovens has increased during the year, because wages and the cost of materials have advanced.

The production of concentrated gas liquor continues to grow. It is estimated that 45,000 tons are now being made annually. Some of this is being used by the ammonia-soda industry, for the manufacture of soda ash; other quantities are being employed for the production of phosphatic-nitrogenous fertilizers, and the balance for the manufacture of sulphate of ammonia. Central works are now dealing with more than 10,000 tons of concentrated gas liquor annually. It is suggested that national exigencies may demand the recovery from gas liquor of all the ammonia, and not merely the free ammonia, as has hitherto largely been the case when manufacturing concentrated gas liquor. It is understood that special plant is being developed, on automatic lines, which will admit of the recovery of the whole of the ammonia, and that the labour entailed will be relatively small. The removal of the fixed ammonia is an advantage, from an effluent liquor-disposal viewpoint. It has been shown, by Dr. Key and his assistants, that the B.O.D. (bio-chemical oxygen demand) test is the most significant single test applied to sewage effluents, measuring, as it does, the rate at which a stream will be denuded of its oxygen by oxidizable matter in the effluent. The lower the content of ammonia in an effluent liquor, the less the need for oxidation to nitrite, and later nitrate.

Co-operative tar schemes now deal with the greater part of the tar produced at the gas undertakings in this country. They have proved an undoubted advantage to the Gas Industry. Colonel Carr, in his Presidential Address to The Institution of Gas Engineers, made clear that co-operation between producer and distiller should lead—and indeed has led—to substantial economies in transport and manufacturing costs. Control and interest in the treatment of tar is now largely in the hands of the producers, with the advice and assistance of the distillers, whose sole business is the technique of tar distillation, and the sales of the products in the markets of the world. About 1,700,000 tons of tar was produced in England and Wales in 1935. Approximately 55% was distilled to pitch, and the balance was treated for the production of road tar. Apparently, there is no co-ordination, in a national sense, in the treatment of tar for the production of road tar. Given suitable treatment, substantially all the tar produced in the country is a potential source of road tar of the best quality. The Industry is without precise information concerning the particular properties which constitute a good road tar, since the existing specifications contain no *ad hoc* tests indicative of the likely behaviour of the tar on the road.

Filled tars are now receiving attention in this country,

and the work undertaken by the B.R.T.A. has led to several suggestions. The filler decreases the susceptibility of tar to effects of temperature, gives a material resembling more closely asphaltic bitumen, it accelerates the rate of surface hardening, and withal retards the hardening of the underlying layer.

Benzole treatment has been the subject of much consideration during the year. A communication by Hoffert, Claxton, and Hancock, of the National Benzole Company, on the restricted treatment of benzoles with sulphuric acid, before stabilization with gum inhibitors, has aroused interest. A refined benzole should be gum-stable, free from colour on storage, and contain not more than a specified quantity of sulphur, and in the refining process these objects should be achieved with the minimum loss of saleable products. The use of inhibitors enables gum stability to be obtained with practically no loss. Sulphur present as carbon disulphide can be removed with only small losses, either by chemical means or by the use of fractionating columns, of which the Barbet type has become popular. The Authors state, from the viewpoint of yield, that it is more advantageous to remove carbon disulphide by chemical means than by fractionation. As regards the elimination of thiophene sulphur, it is concluded that sulphuric acid remains the simplest and cheapest reagent for the purpose. For any particular benzole, the yield obtainable bears a definite relation to the quantity of thiophene removed, and is independent of the amount and strength of acid necessary to effect such removal. Variations in temperature, and additions of catalyst to the acid do not appear to affect this relationship.

Prices of pitch have decreased from 40s. per ton (nominal) to 34s. per ton during the year. Pending the discovery of new uses, it is feared that prices will fall still further. The production of pitch coke for electrode manufacture, as a pulverized fuel for rotary lime kilns, and as a reducing agent for converting barium, calcium, magnesium, and sodium sulphates to their respective sulphides, will afford a means for increasing the demand for this product.

Creosote oil has continued in good demand, and prices have increased from 5½d. to 5¾d. per gallon. The imposition of the tax on imported fuel oils afforded an impetus to the consumption of creosote for several purposes. Its use for hydrogenation purposes at Billingham lent additional stimulus, and it would appear that there will be no lack of demand for some time to come.

The price of naphthalene started in January at about £14 per ton, reached a figure of £24 per ton in April, May, and June, and has now receded to £18-£20 per ton. Increasing quantities of naphthalene are being used for the production of lamp black, phthalic anhydride, by the catalytic process, which takes advantage of ammonium vanadate as a catalyst, and Monastral fast blue (B.S.). The latter is now marketed by I.C.I., and phthalic anhydride is used in the production of glyptal varnishes and enamels. The latter are stable to light and resist photo-chemical reaction. A controlled polymerized resin is obtained by causing glycerol and phthalic anhydride to interact under special conditions.

Benzole prices (crude, motor, 90%, and pure), have declined slightly since January last; yet in order to cope with the increasing demand by motorists for home-produced motor spirit, the National Benzole Company opened new depôts, and extended existing ones, in many parts of the country during the year. This development necessitated additional railway tanks and road tank wagons. It is estimated that more than 40 million gallons of refined motor benzole are now being manufactured per annum, irrespective of some 10 million gallons of other benzene-toluene products.

Tar acids, cresols, and crystal carbolic acid have continued in good demand. The price of 60's crude carbolic has advanced from 2s. 4d. to 2s. 8d. per gallon. A greater quantity of synthetic resins and disinfectants is being manufactured.

Whether the future will witness the production of larger quantities of road tar and the distillation of lesser quantities to pitch remains to be seen. The problem of the tar distiller has always been, and is likely to continue to be, one of delicately adjusting the treatment of tar to the fluctuating demand of the various products, in which price considerations will always be dominant.

Stocks and Shares

Our insular characteristics have been well exemplified by the strength of the financial position during the year. The political and monetary upheavals abroad throughout the whole period and, towards the close, the tragic constitutional crisis in this country have been most disturbing factors. A few years ago only a tithe of these troubles would have had a long-lasting adverse effect on Stock Exchange values. Despite these, however, the situation at home has been one of complete confidence. The steady improvement in trade, as portrayed by the many industrial reports showing increased profits and higher dividends, coupled with the big drop in the unemployment figures, has made further considerable progress, especially among some of the country's most important industries—viz., iron, steel, and shipbuilding. To sum up the situation, it appears we have been minding our own business a little more and materially benefiting thereby.

Conditions on the Stock Exchange, therefore, during the greater part of the year have been very active, on several occasions reaching almost boom proportions in the more speculative sections, and the prices of securities have responded accordingly. Gas stocks and shares have participated to some extent in the improvement, and on the whole displayed a firmer tendency, though being more in the nature of an investment medium any large fluctuations are usually only brought about by a change in monetary conditions or rates of dividend. It will be recalled that during 1935 increases in value were practically non-existent in this market, and some heavy depreciations were experienced. During 1936, as shown by the tables below, several issues have made good progress. Some of the increases among "ordinaries" are, of course, attributable to higher dividends—*e.g.*, Alliance and Dublin and Watford, while the converse is the case with regard to the South Metropolitan and Commercial. The fixed-interest stocks have continued very steady throughout the year, and it will be seen that in contrast to 1935 several now stand at higher levels.

Ordinary Stocks and Shares.

—	1935. Dec. 31.	1936. Dec. 11.	Increase + or Decrease −.
Alliance and Dublin	133—143	167—172	+ 31½
Brighton 5%	156—161	153—158	− 3
Bristol	118—120	118—120	..
Cardiff	133 138	128—133	− 5
Commercial	100—105	93—98	− 7
Croydon sliding-scale	151 - 156	158—163	+ 7
Gas Light units	27/- 28/-	26/—27/-	− 1/-
Liverpool	133—135	132—134	− 1
Newcastle units	25/—25/6	27/9—28/3	+ 2 9
Portsmouth and Gosport	173—178	178—183	+ 5
Sheffield	140—142	146—148	+ 6
South-Eastern Gas Corporation	27/6—28/6	27/—29/-	..
South Metropolitan	131—136	112—116	− 19½
South Suburban	129 - 134	130—135	+ 1
Southampton	115—120	112—117	− 3
Tottenham	149—154	152—157	+ 3
Wandsworth	159—164	159—164	..
Watford	149—154	157—162	+ 8

Preference and Debenture Stocks.

Alliance and Dublin 4% deb.	95 —100	94—99	− 1
Commercial 3% deb.	85 —90	83 - 88	− 2
,, 5% deb.	121 —126	122—127	+ 1
Croydon 5% deb	121 —126	125—130	+ 4
Gas Light 4% pref.	106 —109	104—108	− 1½
,, 3% deb.	89 —91	84—87	− 4½
Mid-Southern 4% pref.	100 —105	102—107	+ 2
Newcastle 4% pref.	107 —108	104—106	− 2½
,, 3½% deb.	98½—100⅝	100—102	+ 1½
South Metropolitan 6% pref.	147 — 152	145—150	− 2
,, ,, 4% pref.	105 —109	104 - 107	− 1½
,, ,, 3% deb	87 —90	86—89	− 1
South Suburban 5% pref.	121 —126	122—127	+ 1
,, ,, 4% pref.	103 —108	102—107	− 1
,, ,, 5% deb	120 —125	123- 128	+ 3
Tottenham 5½% pref.	130 - 135	130—135	..
,, 4% deb.	100 — 105	102—107	+ 2
Wandsworth 5% pref.	121 —126	122—127	+ 1
,, 5% deb	121 —126	127—132	+ 6
,, 4% deb.	102 —107	103—108	+ 1

Holders of, and intending investors in, gas stocks are doubtless aware that the past few years have been very difficult ones for most gas companies. Fierce competition

from the electricity grid has had to be met, necessitating large increases in distribution costs, and since the commencement of this year companies have also been faced with a voluntary addition to the coal bill together with, for the last six months, an increase in wages. They are, therefore, naturally asking whether dividends for the current year will be maintained and what the prospects are for the future. That the Industry has been well able to hold its own during these strenuous times is well borne out by the fact that for many years past the majority of companies have maintained their dividends and in some cases increased them. With regard to the present year, credit must be given for good organization, for where it has been found necessary to pass on some of these extra costs to the consumer a small proportion only has been added to the price of gas—in many instances no increase at all—the balance being offset by effecting substantial reductions in manufacturing costs and minor economies in other directions.

Some indication of the current year's results, so far as they affect the Gas Light and Coke Company, were given recently by Sir David Milne-Watson in his remarks at an extraordinary general meeting of the Company. He said "We are continuing to do excellent business. The sales of appliances . . . are rapidly expanding and the gas consumption is increasing very satisfactorily; in fact, we have beaten our own record so far this year." Another illuminating fact he mentioned was that the sum outstanding on hire-purchase contracts had increased from £645,000 in June, 1934, to £2,688,000 in June last. This, surely, is a good omen. Moreover, in common with our premier undertaking, many other companies are now spending large sums in bringing their district apparatus into line with the latest modern requirements and on hire-purchase appliances, and while the cost of the former should be on a diminishing scale as the work proceeds, larger profits will undoubtedly accrue from the latter. Unemployment is another important factor; if this continues to drop the spending power of the community will become greater. The prospects, therefore, that at least the current rates of dividend will be maintained in the future are distinctly promising.

Gas Progress in Jersey

A Seasonable Booklet for Consumers

"Forging Ahead" is the appropriate title of a seasonable booklet issued at Christmas to consumers of the Jersey Gas Light Company.

Attractively produced and profusely illustrated, the booklet opens with some reflections upon the early history of gas and its subsequent progress in the island since its inauguration there in the year 1830. The gas-works were purchased by the founders of the present Company, we read, in 1856, but until 1862, when Joseph Morris came from the Guernsey Gas Company to take over the management, the career of the Undertaking was somewhat chequered. It is of interest to note that his son, Mr. H. Morris, the present Managing Director, joined him in 1895, thus establishing an uninterrupted family association with the Company of 74 years, during which period development has been rapid.

The booklet goes on to record the method of charging for gas, with an explanation of how to read the meter, together with some interesting facts concerning the by-products of gas making, and a note on the Company's showroom services. The remaining sections make a more direct appeal to the housewife, and clearly show all the advantages to be derived from the use of modern gas appliances, examples of which are illustrated in domestic settings. Particularly interesting are the practical suggestions for the most economical and efficient use of the gas cooker, while the scientific planning of the kitchen also receives attention. A somewhat novel note is struck by the section which stresses the necessity for instantaneous hot water for the treatment of some of the more common ailments by the application of a hot water bottle.

The Jersey Gas Light Company are to be congratulated on the production of this useful booklet, providing as it does a seasonable gift which will be of great interest to all their consumers.

Forthcoming Engagements

Jan., 1937.

2.—LONDON AND SOUTHERN JUNIORS.—Visit to Fuel Research Station, Greenwich.
5.—I.G.E.—Research Executive Committee, 2.30 p.m.
5.—JOINT CO-ORDINATING COMMITTEE OF THE NATIONAL ASSOCIATIONS.—Gas Industry House, 11 a.m.
9.—SCOTTISH EASTERN JUNIORS.—Visit to Alder & Mackay, Ltd., Edinburgh.
9.—SCOTTISH WESTERN JUNIORS.—Paper by W. Giedhill, of Stirling, "Development of a Gas-Works Amalgamation."
11.—I.G.E.—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
12.—NATIONAL JOINT INDUSTRIAL COUNCIL FOR THE GAS INDUSTRY.—Meeting at Gas Industry House, 12 noon.
12.—N.G.C.—Central Executive Board Meeting, 2.30 p.m.
12.—I.G.E.—Council, 10 a.m.
13.—I.G.E.—Board of Examiners, 2.30 p.m.
14.—I.G.E.—Public Lighting Sub-Committee, 2.30 p.m.
14.—MIDLAND JUNIORS.—Paper by G. E. Stevenson, of Long Eaton, "Obtaining the Goodwill of the Consumer."
15.—I.G.E.—Joint Committee on Complete Gasification under Pressure (16, Old Queen Street, S.W. 1), 3 p.m.
16.—YORKSHIRE JUNIORS.—Meeting at Sheffield. Paper by A. E. Wilson, "My Last Twelve Months with Industrial Gas."
19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
21.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Unaccounted-for Gas."
21.—S.B.G.I.—Council Meeting, 2.30 p.m.
22.—LONDON AND SOUTHERN JUNIORS.—Paper by T. J. Legge and T. G. Noble, "Baffler Performance in Relation to the Safety of Gas Appliances."
23.—MIDLAND JUNIORS.—Visit to Walsall Gas-Works.
23.—SCOTTISH WESTERN JUNIORS.—Visit to Port Glasgow Gas-Works.
23.—WESTERN JUNIORS.—Visit to Works of Swindon United Gas Company. Paper by D. A. Vince, of Swindon.
23.—WALES AND MON. JUNIORS.—Meeting at Neath. Paper by D. Rees, of Neath, "Reconstruction of an 1877 Gasholder."
29.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

Feb.

3.—MANCHESTER AND DISTRICT JUNIORS.—Visit to West's Gas Improvement Co., Ltd.; Paper by J. Holland, "Works Reconstruction with Economies."
3.—LONDON AND SOUTHERN JUNIORS.—Visit to Davis Gas Stove Company, Ltd., and Electrolux, Ltd., Luton.
4.—MIDLAND JUNIORS.—Paper by W. N. Smirles, "Gas-Heated Hot Water Systems."
6.—SCOTTISH WESTERN JUNIORS.—Annual Whist Drive and Dance.
6.—SCOTTISH EASTERN JUNIORS.—Visit to Dundee Gas-Works; Paper by D. Warden.
12.—LONDON AND SOUTHERN JUNIORS.—Paper by F. O. Hawes, "The Effects of Changes in Composition upon the Combustion of Town Gas."
13.—SCOTTISH WESTERN JUNIORS.—Debate Meeting.
18.—JUNIOR ASSOCIATIONS.—Visit to B.I.F., Birmingham.
20.—WESTERN JUNIORS.—Meeting at Bath; Paper by F. G. Craxford, "The History and Development of Gas Fitting."
23-25.—B.G.F.—Joint Gas Conference at the B.I.F., Birmingham.
26.—I.G.E.—Gasholder Committee, 2.30 p.m.
27.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting at Edinburgh; Paper by F. B. Holmes, "Scrubbers."

March.

16.—SOUTHERN ASSOCIATION.—General Meeting at Hotel Victoria, Northumberland Avenue, W.C. 2, 2.30 p.m.

Personal

We are informed that Mr. C. S. W. HARRISS will take up the appointment of Assistant Secretary to the Imperial Continental Gas Association (London Staff) as from Jan. 1, 1937.

* * *

To mark their Silver Wedding, the employees of Preston Gas Company presented a silver salver to their Engineer and Manager, Mr. SAMUEL TAGG, and his wife. Mr. J. S. Marshall (Engineer of the Lostock Hall Works) made the presentation.

Correspondence

"Appointments Vacant"

SIR,—I notice in the current issue of the "JOURNAL" that "a large South Coast Undertaking" requires the services of an Assistant to the Sales Manager, and that the appointment carries a good salary and prospects to the right man.

I think it would have been better if the commencing salary had been clearly stated in the advertisement, and, moreover, it would probably have been in the interests of the Undertaking concerned if it had come into the open and stated its name.

C. S. SHAPLEY,
Engineer and General Manager.

City of Leeds Gas Department,
Market Hall,
Leeds, 2,
Dec. 23, 1936.

News in Brief

The Price of Gas at Ardrossan is to be increased by 2½d. per 1,000 cu.ft. as from the last survey of meters.

An Electricity Failure deprived the whole district of Chertsey of current for three-quarters of an hour on Wednesday, Dec. 23, causing great inconvenience at the height of the Christmas shopping period.

The Tender of Messrs. Robert Dempster & Sons, Ltd., Elland, for the reconstruction of the existing two-lift spirally-guided gasholder has been accepted by the Gas Sub-Committee of the Falkirk Town Council.

A Sum of £100 was voted to charities at a recent meeting of the Aberdeen Gas Department employees, presided over by Mr. Samuel Milne, Engineer and Manager. This amount included £50 to the Aberdeen Royal Infirmary.

Offers will be Invited for the Ellesmere Port Gas Undertaking if a recommendation by the Law and Parliamentary Committee is approved by the Council. Earlier in the year, it will be recalled, the Council refused to consider the question of selling the Works.

A New Issue of 3½% redeemable preference stock, 1970, amounting to £993,000 has been placed privately by the Gas Light and Coke Company. This private placing follows a public issue of £2,000,000 of similar stock at 100 in November last which was quoted last week at a premium of 3.

New Showrooms at Willingham are to be erected by the Cambridge University and Town Gas Light Company. This is a new district to which a supply of gas has only recently been extended by the Company. Already a successful exhibition has been held there, and the new showroom is to be so laid out that cookery demonstrations may be conveniently arranged when required.

Three Alterations of Calorific Value are announced in the *London Gazette* for Dec. 18. The Dalton-in-Furness Urban District Council, on and after Jan. 1, 1937, will supply gas of 450 B.Th.U. per cu.ft. The Hayling Island Gas Company give notice that after April 1, 1937, the gas supplied will be of 475 B.Th.U. per cu.ft. Finally, the Portsmouth and Gosport intend to supply gas of 475 B.Th.U. as from March 20, 1937.

The Remarkable Progress of the Buckhaven and Leven Gas Undertaking was shown by a recent report of the Engineer and Manager, Mr. H. A. Aitken, which stated that in 1922 the output amounted to 81 million cu.ft. This figure has increased to 156 million cu.ft. in the past 12 months. During the same period the price of gas has been reduced from 7s. 1d. to 3s. 5d. per 1,000 cu.ft. and capital debt has been brought down from £95,000 to £88,000. In addition, expenditure of between £50,000 and £60,000 on works extension, plant replacement, and new mains has been paid.

Amalgamation and Grouping

Iron Bridge and Wenlock.

Among the objects of a Special Order for which the Iron Bridge and District Gas Company intend to apply to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934, is the purchase of the Wenlock Gas Undertaking. The Iron Bridge Gas Company was acquired by the Severn Valley Gas Corporation in January, 1935, while in February, 1936, the Much Wenlock Borough Council approved the purchase of their Undertaking by the same Corporation.

The Conway Gas Company.

The acquisition of the Gas Undertaking of the Conway Corporation was carried a step further when at a recent meeting of the Corporation it was decided to sell the Undertaking to the Conway Gas Company for £52,150, subject to the granting of a Special Order by the Board of Trade. This decision is the result of many months of negotiations between the Council and Stellite, Ltd.

The terms of the Special Order were given in the "JOURNAL" for Dec. 2. Among the powers sought was the authorization of the Company to contract with Stellite, Ltd., for the purchase from or supply of gas to Stellite, Ltd.

"Gas Journal" Shewring Fund

The Fund having now been closed according to plan, a statement of the final amount available for the benefit of the widow and family of Harold Shewring will be published in an early issue, together with any announcement which the promoters, Messrs. F. G. Shaw, W. W. Townsend, and J. Bridge, may wish to make.

Institution of Gas Engineers

Membership Transfers

The following membership transferences have been effected:

From Associate Membership to Membership.

DREAPER, WILLIAM HENRY, Superintendent and Manager, British Columbia Electric Railway Company, Ltd., Victoria, Canada.

REDWOOD, HAROLD HOLMES, Engineer, Manager, and Secretary, Newmarket Gas Company.

From Associateship to Membership.

PERCIVAL, GEORGE, Works Superintendent, Fuel Research Station, Department of Scientific and Industrial Research, London, S.E. 10.

The Harvey Gardens Housing Estate

Gas Used to Large Extent

Well-designed and convenient houses and flats at a moderate rental are helping to solve the housing problem for a number of the employees of Messrs. G. A. Harvey & Co. (London), Ltd., of Woolwich Road, S.E. 7, who, on a site adjoining Charlton Lane, a short distance from their works, have provided 72 units in all in blocks of two, four, and six houses and four blocks of flats, all grouped round large grass plots, with a space at the rear containing some natural sand hills arranged to form a children's playground.

The houses are of three different designs, but all contain the same accommodation. The equipment includes a "Janus" back-to-back range with boiler supplying the hot water system, a gas copper with hand-pump for filling the bath when the living-room fire is not alight, gas cooker with hood, panel gas fires to two bedrooms, airing cupboard, and wireless earth with aerial in roof. The lighting throughout is by gas with switch control in the living-room.

The houses are built on reinforced concrete rafts in brickwork with cavity walls, and in addition to the Nautilus flues for the gas fires, a further pair provide for the cooker hood and for extract ventilation from under the ground floor.

The flats are generally similar in construction and accommodation, each containing four units, the ground floor flats having two bedrooms, but being otherwise like the houses. The first floor flats, approached by a common staircase, have three bedrooms, the second and third being on the third floor.

As the layout has been based on a density of approximately 12 houses to the acre, each unit has a good garden space. A space has been reserved for garages for motor cycles and cars. The street lighting of the estate is also carried out by modern gas equipment.

Gas Company's Part in Shopping Week

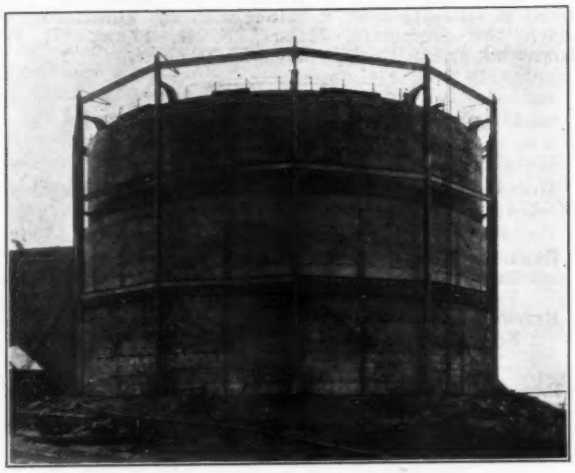
Canterbury's Slogan Competition

We are indebted to Mr. R. Ververs Scott, Engineer of the Canterbury Gas and Water Company, for particulars of an interesting and successful publicity " stunt " that his Company launched in connection with the Canterbury Shopping Week which was held from Dec. 7 to 12. Canterbury claims proudly to be the " shopping centre of Kent," and, therefore, one may feel sure that any successful results would be felt beyond the confines of the City. The Canterbury Company has every reason to be satisfied with the results of its competition.

Two pages of the Souvenir Programme, the profits from which were devoted to the welfare of the Kent and Canterbury Hospital and the Football Supporters' Club Funds, were taken by the Company and devoted to an explanation of the competition, which was closely linked to good publicity for gas. The public were invited to make a phrase using the letters of the slogan " Gas is Best " as the initials of the words used in the phrase.

The first prize was a sink heater; the second, a " Zonex " gas fire; and the third, a " Fairy Prince " gas iron. The number of entries was extremely gratifying and judging was a very difficult task.

Holder Wrecked in June—New One at Work in December



Something of a record must have been achieved at Dewsbury in the erection of a 750,000 cu.ft. gasholder in less than six months. It will be recalled that on June 18 last an accident at the Dewsbury Works resulted in the wrecking of a gasholder. Our photograph shows the new holder, erected by Clayton, Son, & Co., Ltd., of Leeds, which is already in commission.

International Gas Union

Committee Meeting at Montreux

The Committee of the International Gas Union met on Nov. 21, 1936, at Montreux (Switzerland), M. A. Baril (France), the President, being in the chair.

In addition to M. A. Baril, the following were present: Messrs. H. Müller, Vice-President, Plenz, and Schumacher (Germany); J. de Brouwer, Vice-President, and Steinkuhler (Belgium); G. Reclus, Ch. Mothon, Ch. Tixier (France); W. T. K. Braunholtz (Great Britain); M. Böhm, Vice-President, Bondi, and Marazza (Italy); G. A. Brender à Brandis, Vice-President (Holland); F. Escher, Hon. President, M. Thoma, W. Grimm, W. Tobler, H. Zollikofer, and Stoffel (Switzerland); Th. Keclik, Vice-President (Czechoslovakia); and P. Mougin, General Secretary.

After expressing the regrets of the International Union on the deaths of the following members—Messrs. Nübling (Germany), Arthur Hewitt (United States), Danielson (Sweden)—the President presented the new Delegates, Messrs. Hoffmann (Germany), Thuillier (France) replacing Mr. Marcel Lebon resigned, Göth (Sweden).

M. Baril then called upon the Presidents or Reporters of the Commissions that had sat the previous day to make their reports.

The questions on the agenda papers of the German, Swiss, and French Commissions were all examined and will be the object of reports that will be made to the Congress of the International Union in 1937.

The reports will deal with the following matters:

German Commission: " Co-ordination of the Methods of Testing and Guaranteeing Gas-Making Plants."

Swiss Commission: " Systems of Carcassing Buildings " (piping and connections, supervision of mains and customers' meters).

French Commission: " Co-ordination of Methods of Testing Gas Appliances."

(Characteristics of the quality of the gas, output, performance, and efficiency of the gas consuming appliances (definitions); prescriptions and recommendations regarding the construction of gas consuming appliances, with a view to safety whilst in use.)

In particular, the members of the latter Commission requested the Committee of the International Union that, for international relations, the characteristics decided upon should conform to the indications admitted, either by means of an index or a sign which would distinguish them as such.

Mr. F. Escher, in the name of the Tariff Commission, then stated that it was not enough to seek for forms of tariffs, but that it would be better to establish recommendations for the application of really commercial tariffs. He added that he was then occupied with this task that the Commission will be called upon to examine at its next session.

The Committee of the International Union was also informed of the progress that had been made with the Vocabulary on the Gas Industry in three languages (German, English, and French), which will most probably be published in time for the next Congress.

The Committee also decided upon June 11 to 16, 1937, as the dates for the Third Congress of the International Gas Union, which will be held in Paris.

In addition to the reports of the Commissions mentioned above, conferences or communications will be held or made at this Congress, on varied subjects, in the name of the national Gas Associations. The number and titles of the Papers will be made public at the next meeting of the Council.

Mr. W. Tobler, Delegate of the International Union to the Third World Power Conference in the stead and place of the President, then gave a very detailed and very objective account of that important manifestation which was held in Washington during September. He was able to show in a very clear and complete manner the lessons which it had been possible to learn from the point of view of the Gas Industry.

Finally, the Committee of the International Union fixed upon Feb. 19 and 20, 1937, as the dates for the next meetings, which will be held at The Hague.

Cannon Iron Foundries, Ltd.

Continuance of Satisfactory Progress

The annual report of the Directors of Cannon Iron Foundries, Ltd., Deepfields, Bilston, Staffs., indicates clearly that for the second year of trading as a public Company the satisfactory rate of progress attained in the initial period after formation has been maintained.

The net profit for the year after charging all expenses, including depreciation and Directors' fees, is £69,655, against £66,413 last year. To this sum must be added the amount brought forward from the last account (after dealing with the appropriations approved by the shareholders at the last general meeting)—viz., £8,865, making a total of £78,521. From this amount there falls to be deducted the dividends already paid or provided for on the preference and ordinary shares as per profit and loss account amounting to £17,953 and income-tax totalling £16,546, leaving £44,022 available for distribution.

The Directors recommend that the dividends already paid be confirmed and that the above amount be dealt with as follows: In paying a final dividend on the ordinary shares of 10% (less income-tax) making, with the interim dividend already paid, 15% (less income-tax) for the year, £19,063; in transferring to general reserve, £10,000; in transferring to reserve for taxation, £4,000; in carrying forward to next account, £10,959; totalling £44,022.

It is with sincere regret that the Directors have to report the death of Sir Francis H. Pepper, J.P., on Nov. 21. As reported in a previous issue of the " JOURNAL," Mr. G. A. Leitch, B.Sc., has been appointed Chairman in place of Sir Francis, who had held the position since the incorporation of the Company.

Blackpool Extensions

Three Schemes Under Consideration

The Blackpool General Purposes Committee on Friday, Dec. 18, considered three schemes which had been submitted in connection with the Gas Department: (1) A new 3 million cu.ft. per diem capacity gas-making and auxiliary plant, at an estimated cost of £274,000; (2) a 6 million cu.ft. per diem capacity coal gas and auxiliary plant costing £320,000; and (3) a coal gas-making plant of 6 million cu.ft. per diem capacity, and the erection of a carburetted water gas plant with a capacity of 3 million cu.ft. per diem, and the erection of a 3 million cu.ft. capacity gasholder at an estimated cost of £443,000. Plans and specifications are to be prepared for No. 2 scheme, and application will be made to the Ministry of Health for sanction of a loan.

Gas Lighting for 78 Miles of Lambeth Streets

South Metropolitan Company's New Contract

The South Metropolitan Gas Company has secured a seven years' contract for the re-lighting of 78 miles of streets in the Borough of Lambeth.

As in the new scheme for Wandsworth, the Company's patented "Supervia" directional lamp will be used, with high-pressure gas for the principal thoroughfares and low-pressure for the remainder.

In addition to this contract the Company will continue to light some fourteen miles of main road in Lambeth already lighted by high-pressure gas, and will also provide the lighting for the Vauxhall Cross improvement scheme. Of the 117 miles of streets lying within the Company's area of supply in Lambeth, 92½ will thus be lighted by gas.

Wind Pressure on Buildings

A Review by S. M. Milbourne

The publication entitled "Wind Pressure on Buildings" (Second Series), by J. O. V. Irminger and Chr. Nϕkkentved, translated from the Danish by Alex. C. Jarvis and O. Brϕdsgaard, is a very valuable addition to the technical literature dealing with the subject of wind pressure. Dr. Irminger is well known to our readers as a pioneer of research in this important branch of science. His systematic treatment of this subject in an article published in *Ingeniϕren* in May, 1894, and later in a Paper read before The Institution of Gas Engineers in 1899, undoubtedly laid the foundation upon which modern research has been developed.

The present publication forms a continuation of a previous volume entitled "Wind Pressure on Buildings" (First Series), by the same Authors, in 1930. The first series serves as an introduction to the subject and describes the methods and apparatus used in carrying out a considerable number of wind tunnel experiments on small geometrical solids and model buildings. A noteworthy feature of these investigations is the large number of records that have been obtained in regard to the pressure and suction distribution of the wind load for different directions of the wind relative to the symmetrical axes of the models. The second series of experiments deals with what might be considered one of the most interesting fields of modern research on wind pressure—streamline pictures. Some 57 photographs have been obtained of the stream flow on the windward and leeward sides of small model buildings. These photographs were obtained by arranging the models on a movable platform to which a camera was attached. The platform was then drawn through a channel of water at a predetermined speed. Aluminium powder was dusted on the surface of the water in order to render the fluid luminous on its passage round the model, thus enabling the stream flow to be studied and the velocity calculated from the photographic prints. The ingenuity of this device prepared by Dr. Nϕkkentved not only enables the action of the wind vortices in the vicinity of buildings to be clearly observed, but has led to the elucidation of many problems connected with wind pressure on buildings. The stream field of wind in the vicinity of a building is also investigated from data obtained from air tunnel experiments. The effect of the Reynolds number on the pressure and suction coefficients on various parts of buildings and the surface roughness is also discussed. A considerable number of experimental observations have been made with regard to the effect of screens placed at effective distances from the model buildings. The subject matter of the book is copiously illustrated with over 90 diagrams. Those responsible for the design and upkeep of buildings, sheds, and other structures will undoubtedly find this new publication of great value.

Midland Tar Distillers, Ltd.

New Offices at Oldbury

For a number of years Midland Tar Distillers, Ltd., had their Head Offices at Exchange Buildings, Birmingham. On Nov. 2, 1936, they transferred to Oldbury, Birmingham, where they have built new offices on modern lines.

The lay-out of the offices has been arranged to give one large general office, surrounded by a number of private offices, with a main central entrance hall and staff entrances in each wing. The entrance hall is panelled in beech, while the Directors' dining room and board room are in mahogany. The first floor consists of ante-room, board room, and Directors' dining room, kitchen, staff dining room, and women's dining room, while a women's rest room is also provided.

The New Premises.

Throughout the building an ample supply of hot water is always available from gas heaters. In addition, gas is used for all cooking in the kitchens. The offices are heated by a low-pressure hot water system combined with "Vectair" units in each office, the heat being supplied by a coke boiler.

Adjoining the office is the Company's largest works, where considerable alterations and additions are nearing completion. These include a completely new distillation plant—claimed to be the first one of its kind to be erected in this country for the distillation of tar.

Midland Tar Distillers, Ltd., purchase and distil the output of crude tar from about a hundred gas undertakings on a co-operative basis. For this purpose they maintain works at Oldbury, Birmingham, Spondon, Banbury, Wolverhampton, Milton, Queensferry, Brownhills, Dunstable, and Welshpool. These works serve also as manufacturing and distributing centres for road tar and allied compounds produced to comply with many different specifications.

The Company also make and sell benzole, toluol, xylol, solvent and heavy naphtha, carbolic and cresylic acid, pyridine (all grades), whizzed naphthalene, cresylic creosote (all grades), creosote to various specifications, pitch (medium, soft, and special grades), pitch coke, &c. Most of these products are produced at the central refinery at Oldbury.

The Company was formed in 1923, when a number of tar distilling and chemical businesses were brought into the amalgamation. These included:

Messrs. Lewis Demuth & Co., Ltd. . . .	founded	1867
,, Joseph Turner, Ltd.	,,	1850
,, Brownhills Chemical Works, Ltd. .	,,	1889

and the tar distilling businesses of:

Messrs. Robinson Bros., Ltd.	,,	1869
,, Major & Co., Ltd.	,,	1856

Athletic and Social

International Table Tennis at Newport (Mon.).

Included in the team selected to represent Wales against England at Newport (Mon.) on Jan. 2, is Mr. Arthur Sadler, Assistant Production Engineer, Messrs. Parkinson Stove Company, Ltd., Stechford, Birmingham. Mr. Sadler is Captain of Messrs. Parkinson's Table Tennis Section and an "inter-city" player for the First Division, Birmingham. He is a son of Mr. Joe Sadler, the well-known representative of the Parkinson Stove Company, Ltd.

Private Bills to be Introduced in 1936-37

A *Precis* of the Clauses affecting gas interests.

The Barnet District Gas and Water Bill.

The Barnet Company are authorized undertakers for both gas and water. A substantial portion of the Bill deals with the water side of the Company's Undertaking and provides for various small alterations in the limits of supply rendered necessary by the adjustment of Local Government boundaries. The most interesting of the provisions of the Bill relating to gas are those which propose to transfer to the Company from the Watford and St. Albans Gas Company so much of the parish of Rowley in the Urban District of Barnet as is situated between the Company's existing gas limits and a line drawn down the centre of the Barnet By-pass Road.

The Barnsley Corporation Bill.

The Bill provides for the compulsory transference to the Barnsley Corporation of the Gas Undertaking of the Barnsley Gas Company.

The consideration for purchase is £160,000, with the taxed costs of the sale, purchase, and winding up of the Company.

The Bill provides for a variation in the purchase price corresponding to any variation in the profits of the Company after June 30, 1935.

The Bill also authorizes the winding up of the Company and confers upon the Corporation many of the powers normally possessed by Local Authorities in connection with their Gas Undertakings. Of special interest are the two following provisions:

(*a*) Clause 32, which proposes to enable the Corporation to purchase and sell liquid butane or liquid propane or other similar liquids which are intended to be converted into gas and which are derived from a process other than the process of carbonization or gasification of coal or coke and also to use such liquid for the enrichment of gas.

(*b*) Clause 39, which proposes to impose penalties on persons who frequently or habitually use anything other than a coin of the realm for the purpose of operating a prepayment meter.

The Brighton, Hove, and Worthing Gas Bill.

From the point of view of the Gas Industry, this is probably the most interesting Bill deposited this Session.

The Bill is on the lines of the York Gas Act, 1936, and the Gas Light and Coke Company's (No. 2) Act, 1936, which require Local Authorities within the areas of these Companies to give facilities for the carcassing of council houses during the time of their erection. The Bill does not relate which County Councils are not normally Housing Authorities; it would, however, apply to all other Housing Authorities whether or not these Authorities are the Electricity Undertakers of their areas.

The Dunstable Gas and Water Bill.

This Bill is promoted by the Dunstable Gas and Water Company and deals with the conversion and consolidation of the capital of that Company. The Bill also proposes to extend the gas limits of the Company so as to include certain portions of the Borough of Dunstable.

The East Anglesey Gas Bill.

This Bill provides for the incorporation of a new statutory Gas Company to be called "The Anglesey Gas Company." The preamble of the Bill recites that the Gas Undertaking of the Beaumaris Corporation shall be amalgamated with the Amlwch Gas Company, Ltd., and that the amalgamated Undertaking shall be transferred to the new "Anglesey Gas Company." The capital of the new Company is to be £40,000. The Bill will confer the usual powers upon the Gas Company, which will be a sliding scale Company having a standard price of 18d. per therm and a standard dividend of 10% on the original and 7% on the ordinary capital.

The Newcastle-under-Lyme Corporation Bill.

Certain provisions of this Bill relate to the Gas Undertaking of the Corporation. These provisions would confer upon the Corporation rights in connection with patents and supplies of Industrial Gas. The Bill would also give to the Corporation power to establish a meter testing station.

The Pontypool Gas and Water Bill.

This Bill provides for the transfer to the Pontypool Gas and Water Company of the Water Undertaking of the Usk Waterworks Company. The Bill also contains several provisions commonly inserted in Gas Acts and Orders.

The Rochdale Corporation Bill.

This Bill contains various provisions relating to the Gas Department of the Corporation. Among these provisions is a clause which would enable the Corporation to lay down pipes in order to connect such premises to a service pipe already laid for the purpose of supplying gas to adjoining premises. For this purpose the clause would entitle the Corporation to cut or otherwise interfere with party walls or fences.

The Corporation also seeks power to purchase and sell liquid butane or liquid propane or any other similar liquid which is intended to be converted into gas and which is derived from a process other than the process of carbonization or gasification of coal or coke and also to use such liquid for the enrichment of gas supplied by them.

It is also proposed to provide that any person who places any coin or thing other than a coin of the realm in the coin box of a gas prepayment meter shall be deemed to have fraudulently abstracted gas.

The Rotherham Corporation Bill.

The Corporation seeks power to erect gas-works upon land scheduled in the Bill.

The Wandsworth and District Gas Bill.

This Bill deals with the conversion and consolidation of the capital of the Company and confers additional capital and borrowing powers.

Electricity Bills.

Certain of the Electricity Bills deposited may be of interest to the Industry. These Bills are mainly concerned with such questions as amalgamations and joint workings. The Lancashire Electric Power Bill confers upon the Lancashire Electric Power Company additional powers to acquire Electricity Undertakings within their area of supply.

The Bill would enable the purchase price to be paid, either wholly or in part, by the allotment of shares or stock.

Further powers with regard to investment and joint working are also conferred upon the Power Company.

Another Bill seeks to incorporate a Company to be called the "North Devon Electric Power Company," for the purpose of producing, generating, and supplying electrical energy and using water for furthering such production and generation.

The Bill empowers the Company to make an aqueduct and to lay pipes.

The area within which the Company may supply electricity in bulk consists of the City of Exeter and a large portion of North Devon. A somewhat similar Bill known as the North Devon Water Bill will incorporate the North Devon Water Company for the purpose of supplying water in bulk to Exeter and large tracts of North Devon.

The North Metropolitan Electric Power Supply Bill confers various powers to purchase Electricity Undertakings on the North Metropolitan Electric Power Supply Company.

The Wessex Electricity Bill seeks to confer further powers upon the Wessex Electricity Company to purchase Electricity Undertakings within and adjoining the Company's area of supply. The Bill also contains a number of provisions of the type usually inserted in Electricity Acts and Orders.

The Crystallization of Concentrated Liquor

By
W. F. THORNE, B.Sc., F.C.S.,
Chief Chemist, Bournemouth Gas and Water Company

During the course of manufacture of concentrated gas liquor it was found that the temperature at which crystallization commenced appeared somewhat irregular and haphazard, and that while on some occasions one could readily produce a liquor containing 19% w/w of ammonia without any crystallization, yet on other occasions liquor containing only 17% w/w of ammonia would crystallize at relatively high temperatures. An investigation was therefore started with the object of correlating crystallizing temperatures and compositions.

A large number of "concentrated liquors" were made up in the laboratory having definite predetermined analyses. Three sets of liquors were prepared containing 3%, 6%, and 9% w/w of H_2S respectively, while the ammonia contents covered the range 16-20% w/w and the CO_2 contents 11-19% w/w.

The liquors were placed in stoppered tubes and covered with a layer of paraffin to prevent volatilization. The tubes were then kept at room temperature, with frequent stirring for several days.

Those tubes in which the materials had completely dissolved were cooled at the rate of about 1° C. per hour, with frequent stirring and the temperatures taken at which crystallization commenced.

The remaining tubes were warmed at the rate of about 1° C. per hour with frequent stirring until complete solution was obtained. Heating was further continued for 2° C. and then cooling commenced at the rate of about 1° C. per hour, and the temperature noted at which crystallization occurred.

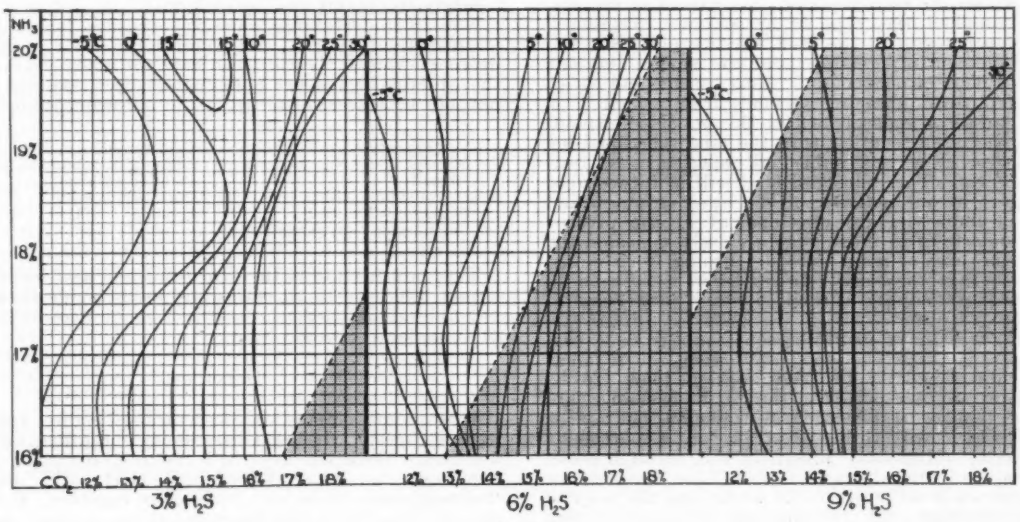


Fig. 1.

The crystallizing temperatures are set out in fig. 1 as isotherms. The shaded portions of fig. 1 represent those compositions which consist of ammonium bicarbonate, ammonium carbonate, and ammonium sulphide. The light portions represent those compositions consisting of ammonium carbonate, ammonium sulphide, and free ammonia. The broken line shows those compositions containing ammonium carbonate and ammonium sulphide only.

The value of the ratio

$$\frac{\%\text{ of } CO_2}{\%\text{ of } NH_3 - \%\text{ of } H_2S} \qquad \text{(S)}$$

serves as a useful index to the constituents of concentrated liquor. If the value is greater than 1·3, then the liquor contains ammonium bicarbonate, ammonium carbonate, and ammonium sulphide; if less than 1·3, then ammonium carbonate, ammonium sulphide, and free ammonia are present. If the value of the ratio is exactly 1·3, then the liquor consists of ammonium carbonate and ammonium sulphide only.

A study of fig. 1 will show that in the case of a liquor containing 18% w/w of NH_3 and 3% w/w of H_2S, the value of the ratio S must not exceed about 1·0 if no crystallization is to occur above 10° C. On the other hand, if the liquor contains 18% w/w of NH_3 and 9% w/w of H_2S, then the value of the ratio S can rise to 1·6 without any crystallization occurring above 10° C. In other words, if the amount of H_2S is low, then the liquor must consist of ammonium carbonate, ammonium sulphide, and free ammonia to avoid crystallization, whereas if the amount of H_2S is high, then ammonium bicarbonate can be present in appreciable quantities without giving rise to crystallization.

Table 1 shows the maximum amount of CO_2 that would produce a concentrated liquor crystallizing at a temperature not exceeding 10° C. Table 2 shows the equivalent values of the ratio S. Tables 3 and 4 give the corresponding values for a temperature not exceeding 0° C.

TABLE 1.

NH_3.	3% H_2S.	6% H_2S.	9% H_2S.
%	%	%	%
20	16·0	15·9	15·0
19	16·2	15·2	15·2
18	15·5	14·2	14·2
17	13·4	13·7	14·2
16	13·3	13·8	14·6

TABLE 2.

NH_3.	3% H_2S.	6% H_2S.	9% H_2S.
%	%	%	%
20	0·95	1·13	1·36
19	1·01	1·17	1·52
18	1·02	1·18	1·58
17	0·97	1·24	1·78
16	1·02	1·38	2·08

TABLE 3.

NH_3.	3% H_2S.	6% H_2S.	9% H_2S.
%	%	%	%
20	13·3	12·3	12·4
19	15·3	12·9	13·3
18	14·8	12·6	13·2
17	12·6	12·3	13·3
16	12·6	13·5	14·2

TABLE 4.

NH_3.	3% H_2S.	6% H_2S.	9% H_2S.
%	%	%	%
20	0·79	0·89	1·13
19	0·96	1·00	1·33
18	0·99	1·05	1·46
17	0·91	1·12	1·66
16	0·98	1·35	2·03

It is worthy of note that:
(1) A saturated solution of ammonium bicarbonate at 15° C. contains 3·3% ammonia.
(2) A saturated solution of ammonium carbonate at 15° C. contains 14·9% ammonia.
(3) A saturated solution of ammonium sulphide at 15° C. contains 21·2% ammonia.

In general, it would appear that concentration of ammonia of 20% w/w or more could readily be produced without crystallization if the relative amounts of CO_2 and H_2S were adjusted according to the above figures. However, with small amounts of H_2S present it appears inevitable that the liquor should contain an appreciable quantity of free ammonia.

NOTES ON THE Distribution of Gas

by
A. H. DYER,
of Newport, Mon.

From a Paper presented to the Wales and Monmouthshire Junior Gas Association at a meeting held at Newport on Nov. 28—the PRESIDENT (Mr. J. H. Chapman, of Swansea) presiding.

I propose merely to confine my remarks to notes on the subject affecting gas undertakings and consumers. Distribution has recently become of great importance. Much consideration has to be given at the present time to the question of laying new mains and the renewal of old ones. When new mains are contemplated, the nature of the district to be supplied, the type of prospective consumers, the future development of the area, the distance from the works, the question of pressure, and the general lay-out have to be taken into account. Most towns and cities have prepared town planning schemes from which it is possible to obtain a general idea of the possible development of a given area together with the land scheduled for special purposes, such as industrial, open spaces, residential areas, &c. The industrial load will in future play a greater part in our activities. We have only touched the fringe of industrial gas development at the present time, and undertakings must very seriously consider the question of the sizes of mains passing through such industrial areas so that they may always be in a position to give an adequate supply without further large capital expenditure.

Residential areas have also to be considered from several angles. First, is there likelihood of further development in the neighbourhood; is the consumption likely to be considerable at any one period of the day? Secondly, are there prospects of central heating in a cinema, church, or public hall which will throw a strain on a particular stretch of main, and so cause dissatisfaction through possible bad pressure in the district? Again, the comparative heights above sea level between the works and the area to be supplied together with the question of whether high levels have to be encountered on the route must be considered. This will decide whether or not it is advisable to govern the supply to any particular district. These remarks apply, of course, chiefly to low-pressure mains.

The sizes of mains in a high-pressure system will be considerably less than with low-pressure, and although various opinions are held on the merits of each system it must be remembered that every town and district has its own peculiarities and it is better to have an open mind on the subject until all the problems have been considered.

More difficulty than ever is now being experienced in the tracing of escapes. Modern road surfaces do not allow the escaping gas to percolate, and as a result the actual escape is often found some distance from the point at which it is reported. Ducts, disused pipes with open ends which have been left unsealed, culverts, and drains are also methods by which escaping gas can travel. Before opening on an escape in this type of road it is as well to obtain knowledge of where these ducts, &c., are situate, and to make thorough tests owing to the difficulty of excavation and also high reinstatement costs.

The flexible type of joint is now being increasingly used and is usually very easy to lay, but care must be taken that the bottom of the cutting is of a solid nature and that the main is adequately packed so that no sag will occur. With this type of joint no escape as with other types of joints will occur but a "dip" may be formed, which though not at once apparent, may cause trouble to the supply. Lead joints would, of course, "pull" in such circumstances and cause an escape, the resulting "dip" being noticed when carrying out the repairs.

It is essential that accurate records be kept of positions and depths of mains, not only to save unnecessary searching in future but for the purpose of easy reference in the case of extensions. Roads are continually being altered and unless these records are made and kept up to date the time will come when difficulty will be experienced in locating the mains and connections.

Not all undertakings have an accurate record of every main in their district, particularly the older ones, and to overcome this at Newport, we have for many years adopted the practice, whenever a main had been exposed for any purpose whatever, of securing the following information:

Name of road.	C.I. or steel.
Opposite house No.—or other point.	Distance from building line.
Size of main.	Right or left hand from.
High or low pressure.	Condition of main.
Depth below road surface.	Remarks.

This information is then card-indexed and forms a very handy reference to all mains and at the same time gives a valuable guide to the necessity of renewal or examination of mains and services.

Services.

Services are equally as important as mains, and in new houses particularly great care should be taken when these are laid. With the detached and semi-detached types of dwellings, the four services, gas, electricity, water, and drainage, have to be laid fairly close together. The builder usually lays his drains before he allows anyone else to lay his service and as a result the ground in which they have to be laid is usually fairly soft. This does not affect electric cables or lead water services as much as gas services, unless the service layer is able to work in virgin soil. If he does not, the subsequent settlement of the ground, even if it does not break off the service, will, in all probability, cause a dip unless the pipe is adequately packed. Should this occur the gas undertaking will be caused needless expense, but, what is more important, the consumer will be caused annoyance which with a little care could be avoided. The relative positions of the electric cable and the service should also have careful attention in order to minimize the danger of electrolysis or fusion. The size of pipe laid should be sufficient to meet prospective future requirements as it must be realized that many types of apparatus now being installed have heavy hourly consumptions. The material to be used for services is also controversial, but we have for many years used 1-in. wrought-iron pipe to I.G.E. Specification, coated and wrapped, covering the connections with a tar compound and hessian wrapping, and so far our experience has been quite satisfactory. Some undertakings still drill the main on top, using a bend, but we have found that it is better practice to drill the main on the side. This method does away with the necessity for a bend which is likely to give trouble with rust or naphthalene, and in addition, where mains are fairly shallow, has the added advantage of giving considerably greater depth to the service, a very important point in these days of heavy road transport. In all cases where large services are being installed for industrial purposes, for stores, public buildings, &c., a valve should be fitted in the pavement so that, should necessity arise, the

supply can easily be cut off without having to go inside the buildings.

Various methods have been used when renewing services, but where this has to be carried out in main thoroughfares or modern road surfaces, the best and easiest plan is to lay service feeders, making certain that all old services have been disconnected and plugged off at the main.

Carcassing.

Carcassing has, in the past, been done chiefly in iron or compo pipe, but copper tubes are being increasingly used for this purpose. Copper has the advantage over iron that it does not rust, is easily bent, and with the type of joint now available is much easier to install. Compo has been considered by some engineers as too likely to be punctured by nails and to be easily flattened out, but our experience is that the number of cases of this kind is so small that the advantage of cheapness and ease of running overcome these disadvantages.

The diameter of interior pipe to be installed naturally depends on the size of the house to be carcassed and the prospective consumption, but there are certain standards to which one can work. I would suggest that in the average size house at least a $\frac{3}{4}$-in. and if possible a $\frac{1}{1}$-in. main supply should be laid, as even though the immediate consumption might be that of a cooker and a boiler only, the securing of an order for extra apparatus such as a water heater or fire will be easier if the consumer can be informed that it will not be necessary to re-run a considerable portion of the supply pipe in order to give proper service. Undertakings which secure orders to install points in every room in new houses are fortunate, as they have better future prospects of good business in gas fires, either of the fixed or portable type, gas pokers, &c. These branch supplies should be at least $\frac{1}{2}$ in. so that a fire of any size can be fixed without any worry regarding the supply. All pipes other than those in the floors or ceilings should be chased in the walls, as nothing is more unsightly or annoying to the consumer than to see gas pipes "dangling" about the room. Where points only have to be run I would strongly recommend that capping plates stamped with the word "GAS" be fixed, as if ordinary caps are used there is danger when the house is being completed of their either being plastered over, the skirting board fixed over them, or being pushed under the floor boards. In addition, with these fixed it is a simple matter to fit a gas tap, and the supply is ready for use.

Most houses now have both gas and electricity installed and every effort should be made to see that gas pipes are not in contact with or run close to electric wiring. Where it is necessary to cross, adequate clearance should be given, and if necessary, a piece of insulating material should be placed between them. It should always be remembered that the gas supply is a very good return to earth for stray electric currents and it is much better to anticipate possible trouble in this respect rather than come face to face with the dangers of electric fusion.

Meters.

It is essential, if you are to give the consumer a trouble-free service, that the meter should be of ample size to meet all requirements, particularly where instantaneous water heaters or other apparatus with high consumptions are fixed. I hope the day has gone when 3-lt. meters are fixed for geysers (generally without the knowledge of the gas undertaking). Meters are fairly delicate instruments and must be treated as such. The continual overloading of anything mechanical results in the end in a breakdown and this is no doubt the cause of much meter trouble. The fixing of another meter does not end the difficulties of this nature as consumers are sometimes hard to convince, when arranging the quantity of gas to be assessed as used, that it is not the gas undertaking's fault that the meter has broken down. Meters are now being made with inlets and outlets at the bottom which should prove a boon to undertakings who experience difficulty with meters breaking down owing to "liquid." In cases where trouble of this nature is experienced and meters with inlets and outlets at the top are installed, a "tail" syphon should be fixed on the inlet of the meter to collect the condensation, but it is essential that such syphons be periodically inspected as otherwise the benefits to be derived from carrying out this work may be negatived should the condensate be more than sufficient to fill the tail piece. The position of the meter is also important. How often do we see the prepayment meter fixed in such a position that it is necessary to use a chair or even steps to insert the coins. This is certainly not encouraging consumers to make the full use of the gas installation, particularly where elderly or infirm people are concerned. With the ordinary meter the position is not quite so important as that of the prepayment type, but we must always bear in mind the possibility that a slot meter may have to be fixed in place of the ordinary and should the latter be fixed in one of the many well-known awkward positions the consumer will have to bear annoyance or the undertaking will have to go to the expense of altering the position of the meter. There is also another aspect to this question. Many people who have purchased, or are purchasing their houses, have naturally become "house proud," and their annoyance can readily be understood if it is the intention to fix the meter, which is not altogether a thing of beauty, in such a position that it is in full view of anyone entering the house, or, say, on a nicely decorated wall. In most new houses the meter can be fixed under the stairs which generally seems the most suitable position. The ideal to be arrived at, however, is accessibility without conspicuousness.

Fixing of Apparatus.

It is unfair to the fitter to send him on to the district to fix a new piece of apparatus, which possibly he has never seen before, unless he has had proper instruction or been allowed to study its construction. Many complaints are received after apparatus is fixed when the consumer finds that it is not working as he anticipated, and the prestige of the undertaking suffers if the fitter has to get further advice before the defects can be remedied. Particular attention should be paid to the rated consumption of the apparatus as, unless this is adhered to, either inefficiency or even serious trouble may arise, particularly in water heaters where considerable damage may be done if the rate is set too high. Pressure, of course, enters very largely into this question as some undertakings have fairly large fluctuations at various hours of the day. Where this is the case, it would be a great advantage if all apparatus were governed, but this is an ideal which we have not yet attained. Fitters, generally, seem to have a tendency to adjust fires to pass too much gas. This is worse than setting them too low as when the fire is full on the efficiency will be lowered through the excess heat going into the flue instead of being radiated into the room.

Industrial Gas.

Each industrial problem is a separate study and it would be impossible to lay down any hard-and-fast rules. I would like, however, to relate my own experience with an enquiry for a machine which would "blue" boot protectors and hob-nails of various sizes. Experiments were conducted, and an open-ended furnace was first considered, with a travelling conveyor for carrying the protectors. The rate at which this would travel would have to be determined by the quantity to be treated and the gas consumption per hour. The difficulties attached to this method were many, the chief of which was that the material would have to be collected in a container or box after passing through the furnace and would form in time a fairly considerable pile. It was found after these protectors were "blued" that if they were left in a heap they lost their colour. To overcome this it was necessary to spread the protectors on thin steel plates so that they would cool quickly and not lose colour. With this furnace it would have been essential that an operator be in constant attendance on the outlet side to spread the protectors. The firm did not feel justified in expending this amount of money on labour as the extra price they received for "blued" material did not warrant it. Finally in collaboration with the manufacturers a rotary barrel furnace was designed which could be loaded with 3 cwt. of studs in approximately half a minute, the action of starting the machine to rotate automatically setting the gas rate from the pilot to full on. It was found from experiments that this furnace was capable of "blueing" 590 lb. of protectors an hour at a gas rate of 330 cu.ft. per hour. From this it was found that 3 cwt. took approximately 35 minutes. At the end of this period the inspection door was opened to see that they were the correct colour, and then by rotating the barrel backwards the protectors immediately fell out into a large steel tray and they were then spread out on an adjoining steel floor and allowed to cool. With this method it was found that the man in charge need only visit the furnace approximately every half an hour, and consequently could spend practically all his time on other duties, saving a considerable amount in labour as compared with the conveyor type, and in addition the cost of gas per cwt. of material treated was also lower. This apparatus has now been in use some four years and has been working continuously giving every satisfaction.

The Ceramic Society

Autumn Meetings of Refractory Materials and Building Materials Sections

The Autumn Meetings of these two Sections of the Ceramic Society were held on Nov. 17, 18, and 19 at the Institution of Mechanical Engineers. Of the Papers presented, the following have been selected for brief notices.

A Note on the Spalling of Fireclay Bricks

By H. D. BENNIE

To illustrate the irregularity of mechanical strength of the average firebrick, results of tests for crushing strength at room temperature, made on twenty bricks taken at random from a manufacturer's stock, are cited as ranging from 2,542 to 3,987 lb. per sq.in. Lantern slides were used to show moulding flaws, air cavities, and laminations in bricks as causes of irregular distribution of strength, thus lowering the resistance of a brick to any mechanical or thermal shock.

The splitting away of the fused surfaces of bricks exposed to very high temperatures and then suddenly cooled is a different case, and so is the splitting-away of that layer of a firebrick lining which has become impregnated with glass, slag, or metal.

The Author suggests that spalling should be considered solely as the inability of a given brick or piece of brickwork to withstand cycles of temperature fluctuation, or rapid heating or rapid cooling, *when the maximum temperature is insufficiently high to promote a rapid increase in the amount of glassy material formed* during the kiln firing of the bricks; and that higher temperature spalling effects should be treated rather as slag or fusion. This would avoid the confusion due to conflicting evidence.

For studying the effect of moderate temperature spalling, firebricks made of a Scottish fireclay and corresponding grog, of specified chemical and mechanical analysis, were tested for crushing strength after several cycles of temperature fluctuations. Five tons of fireclay and one ton of grog were mixed together, and the mixture was divided into three parts.

One part was prepared in an edge runner mill for hand-moulding by the soft plastic method; the batch contained 17·30% water.

Another part was mixed with water in a double-shafted paddle mixer, fed thence into a closed horizontal pug mill, and extruded as a clay column. This was wire cut and the clods pressed. Water content of the clods as pressed was 11·26%.

The third part of the mixture was fed into a mixer, water in the form of fine spray was mixed with it, and the product fed at a water content of 4½% to the press boxes of a semi-dry machine.

The dried bricks were fired together to thermoscope bar 31 melted down, 32 bent, 33 only slightly bent. The porosity of the bricks averaged from 22·95 to 23·64, showing no marked difference, but the cold crushing strength of the semi-dry bricks was less than half that of each of the other two groups.

Bricks of each type were heated in seven hours to 1,050° C., and kept at that point for an hour, each being then placed upon a cold iron plate and the cold crushing strength determined.

Another set of bricks was then subjected to five cycles of heating to 1,050° C. and cooling on the iron plate before determining the crushing strength, and a third set was subjected to ten cycles before the determination of the crushing strength.

Estimation of the effect of the spalling conditions by inspection showed that the semi-dry brick was most resistant, the stiff plastic brick next, and the soft plastic brick least resistant.

In most cases the soft plastic bricks showed reduced strength after being subjected to mild spalling conditions. The stiff plastic bricks showed reduced strength after one cycle, a further slight reduction after five cycles, and an increase in strength after ten cycles. The semi-dry bricks showed a large increase in strength after one cycle of heating and cooling, somewhat less strength after five cycles, and still less after ten cycles, but the final strength was nearly 20% greater than the crushing strength of specimens fresh from the kiln. These results suggest great possibilities for the improvement of the resistance to spalling of fireclay bricks, as, for example, by investigations on adjustment of the grading, by altered kiln burning conditions, and by de-airing much lower porosity can be achieved with the stiff plastic and semi-dry processes. Also the test might be modified by heating only one-third of a brick to 1,050° C., leaving the rest of the brick protruding from the furnace.

If such investigations should lead to the production of a firebrick of low porosity to resist moderate temperature spalling conditions, that would be a long step towards overcoming spalling under all conditions.

The Action of Alkalis on Refractory Materials

Part II.—The Action of Potassium Chloride Vapour on Refractory Materials at 1,000° C.

Part III.—Volatilization from Alkali Impregnated Refractory Materials at 1,000° C. and 1,100° C.

By F. H. CLEWS, M.Sc., A.I.C., and A. T. GREEN, F.I.C., F.Inst.P.

Part II. is very briefly summarized by the Authors as follows:

Data have been presented in regard to the attack on three types of refractory products of dry potassium chloride vapour at 1,000° C. for periods up to 367 hours. The attack was slight in the case of the silica product, appreciable in the case of the aluminous product, and still more pronounced with the fireclay product. In no case was disintegration or appreciable fluxing of the products observed.

Part III. (like Part II.) gives results of experiments in tabular form, as well as graphically.

The Refractoriness-under-Load Test

Part I.—The Effect of Varying the Rate of Increase of Temperature, the Cross Section of Test Piece, and the Effect of the Supports.

By F. H. CLEWS, M.Sc., A.I.C., A. GREEN, and A. T. GREEN, F.I.C., F.Inst.P.

The following brief summary by the Authors may serve to indicate the scope and chief results of this investigation.

1. Specimens measuring 3·5 in. by 2 in. by 2 in. of nine representative fireclay and silica materials have been submitted to refractoriness-under-load tests, taken to complete failure by the modified Mellor-Moore method, using rates of heating of 15°, 10°, 5°, and 3° C. per min. With a load of 50 lb. per sq.in. there is a difference of as much as 100° C. for the fireclay, and 60° C. for the silica material for the temperatures of failure, using the fastest and slowest rates. The difference is ascribed to the greater gradient of temperature within the test piece when heated more quickly. The slower the rate of rise of temperature the less misleading is the result.

2. Specimens of a fireclay and a silica material of the same height and differing areas of cross section show results which can be reasonably interpreted on the basis of temperature gradient within the test pieces. The influence of shape, in itself, was not conspicuous.

3. The expansion of the supports and thrust blocks distorts the shape of the deformation curve of refractory materials. The true temperatures of initial softening with two fireclay materials were found to occur from 100° to 350° C. below the maxima on the uncorrected curves. Unpublished results on other fireclay materials confirm this.

With the completion of the projected programme it is hoped to have sufficient data for recommendations to be made on the subject of refractoriness-under-load testing.

Apparatus for Determination of the Porosity of Firebricks by Gas Expansion

By H. T. S. SWALLOW, B.Sc.

The Author points out the advantages of the gas expansion method compared with the liquid absorption method. The gas expansion method is more accurate, more rapid, and the determination can be made on full-sized bricks.

The principle of the method is explained, apparatus designed for the determination of porosity and the method of using it are described in detail, and the errors likely to arise are discussed.

Notes on the Mechanical Properties of Refractory Materials

By A. L. ROBERTS, Ph.D.

This Paper comprises a discussion of various mechanical properties, such as the modulus of elasticity, ultimate strength or breaking stress, and the " flow " characteristics associated with the development of plasticity under certain conditions of temperature, &c.

INSTITUTION VICE-PRESIDENT

Addresses

Scottish Junior Gas Association

Mr. R. Robertson, Junior Vice-President of The Institution of Gas Engineers, addressed a Joint Meeting of the Eastern and Western Districts of the Scottish Junior Gas Association at Glasgow on Dec. 12.

For over a hundred years, the Gas Industry has been engaged in carbonizing coal and marketing the products. Its history has been one of steady progress and development, and to-day it is a highly organized national industry in which £200,000,000 are invested and 100,000 men employed in carbonizing 18,000,000 tons of coal per annum, to give light, heat, and power to 40,000,000 people.

The Present Position.

Measured by the range and quality of gas-works plant available to-day, the efficiency of its processes, and the standard of its technique and personnel, the Industry is better equipped than ever it was. It has even been suggested that activities on the manufacturing front should now be eased off, in order that the Industry's energies might be concentrated on other fronts and, in support of this, Newbigging's dictum that " profits are made in the retort house " has recently been referred to as " no more than an antique reposing in the Industry's historical archives and labelled *requiescat in pace*." But whatever fresh activities the new conditions require, economic production must continue to be a matter of prime importance to the Industry and the demand for cheap gas is greater to-day than ever it was.

On its merits, gas is still the cheapest domestic fuel for most purposes, but the greater freedom enjoyed by the electrical industry and the extent to which it is favoured by local authorities enables it to compete on terms denied to the Gas Industry. In the industrial field we are competing with cheap alternative fuels which require that gas prices shall, on occasion, be something of the order of 2d. to 3d. per therm; unless the Industry can offer this, the most up-to-date and well-equipped selling organization is helpless, or at least limited in its scope. Only by persistent concentrated efforts on ALL fronts can the best interests of the Industry be served—and there is no reason why this should not be done.

Within limits, the problem of producing cheap gas has been solved by those undertakings which have had the opportunity and the enterprise to break away from traditional gas-works practice and collaborate with the coke oven industry. To some extent also, the problem has been solved by those undertakings which, over a number of years, have pursued a frugal policy in respect of capital expenditure, and by those also which, by skilful marketing, aided perhaps by local circumstances, have been able to maintain the net cost of coal at a low figure.

Although to most of you the opportunity for service in these directions may not have arrived, it is never too soon for the junior official to begin acquiring the outlook and habit of mind which will lead to the proper reaction when the opportunity does come, and there is no better way than studying the economic aspect of all operations which come within his province as carefully as he studies their technical aspect; meanwhile, he has many opportunities at hand for contributing to the production of cheaper gas.

It is customary to speak with pride of the 75 to 85% thermal efficiency of the carbonizing process, and this does not offer a great deal of scope for improvement because of the comparatively low temperature at which the heat is lost—as sensible heat in the products and waste products and as radiant heat from the setting—rendering recovery both difficult and costly. The efficiency of the C.W.G. process is, of course, much less, but, so far, means of increasing it materially have eluded the Industry.

There is, however, a very definite margin representing the difference between the best and the worst managed works, and the junior should be particularly interested in this margin because retort house control and the multifarious routine jobs which come within his province are important aspects of works management; and, if I may venture a word of advice, shortcomings in this direction are usually the result of a human propensity to take things for granted and assume that what should be, is. The coal delivered is according to specification, the stoker and fireman have done just as they ought to have done, the producers and regenerators have functioned exactly as they should have functioned; it is even not unusual for the individual to include himself in this optimistic survey and to imagine fondly that he, too, is doing all the things that he ought to do and refraining from all the things he ought not to do. It is well, therefore, to cultivate the critical faculties, even to the extent of assuming that all is never quite well and to address ourselves to the task of finding out where and why and how to put it right—and it is surprising how often the assumption is justified.

One other aspect of works management which may contribute to price reduction concerns the quality of the by-products. Thus, the prospects of tar for road making purposes depend upon the maintenance of a uniformly high standard of quality in production. Then again, the value of coke as a fuel has been greatly improved and its uses increased in number by screening and grading and by reducing the moisture content to a minimum. The selection and blending of coals and pre-cleaning at the colliery are also important features in determining the quality of coke, and although the reorganization of the coal industry now proceeding might not, at first sight, appear to be helpful in this direction, yet, if the Gas Industry be prepared to meet collective selling by collective buying, the reorganization of the coal industry may ultimately prove to be to its advantage. For this reason an intimate knowledge of the various coals should prove a valuable asset which it would be well for the future gas manager to acquire by a careful study of the information now available, not only in the files of the Industry, but in the reports of the Fuel Research Board and of the Physical and Chemical Survey of the Department of Scientific and Industrial Research, and elsewhere.

Future Possibilities.

But the Industry has need for more than careful, observant, and efficient control of its processes and by-products. Imagination and vision are also required, qualities which it has to be admitted do not always accompany the more

modest virtues. You may recall the story of the boy who, in the early days of the steam engine, was employed in operating the control valves; the work was monotonous and his heart was outside with his playmates, but he had imagination and devised an arrangement of strings and rods which made the engine operate its own valves and thus an important contribution to the development of the steam engine was made.

It may not be altogether a waste of time, therefore, if, in your more ambitious moods and more inspired moments, your thoughts turn, perchance, in this direction, to refer to other and more spectacular means which have been suggested and tentatively investigated of effecting improvements and economies in gas-works practice.

For obvious reasons the complete gasification process has received a great deal of attention, but the complex character not only of coal but of its intermediate and final products has, so far, defeated efforts to achieve success, in this country at least. In Germany, however, successful results have been obtained with the use of oxygen and steam under high pressure, which suggest the possibility of a controlled complete gasification process capable of producing as required either town gas of 450-500 B.Th.U. or a synthesis gas from which liquid hydrocarbons could be obtained. The synthesis of methane or, alternatively, liquid hydrocarbons from water gas has also been demonstrated to be practicable, and this suggests a process the flexibility of which should commend it to the Gas Industry as an ideal means of varying the products and equating supply to demand in respect of gaseous, liquid, or solid fuel.

The production of home-made fuel oil is likely to become a matter of national importance in the future. The consumption is increasing year by year and the proved sources of supply, according to some authorities, will only suffice for 15 years at the present rate of consumption; but whether the Gas Industry will be able to secure a substantial share in this business will depend upon its ability to accommodate its outlook and its operations to meet the demand.

The complete self-contained process appears to be the ideal solution of the purification problem also. This side of gas-works practice has not received as much attention as the gas making side, probably because the purification plant, both wet and dry, evolved at an early stage was simple and effective and its comparatively long life afforded fewer opportunities for reviewing and improving the design than in the case of the carbonizing plant; further, it was for long a source of considerable revenue which favoured leaving well alone. Now, however, the position is different. The purification process is no longer an asset but a liability, and features which were taken for granted when the process paid its way are liable to be criticized when it does not. Thus, the occasional changing of the dry purifiers is one of the least pleasant jobs in a gas-works and the subsequent operations of disposing of the spent oxide to the acid makers and buying back the acid for use in the sulphate of ammonia plant appears to be unduly cumbersome, circuitous, and expensive, especially when the inclusive operations are liable to be carried on at a loss.

Meanwhile, we know that ammonia and sulphur have certain affinities and the proportion in which they appear in crude coal gas is such that, if complete combination could be effected under controlled conditions, all the ammonia would be converted into sulphate of ammonia and the final sulphur purification, which would be reduced by 60 to 70%, might be carried out, in turn, in a self-contained process with liquid reagents. Plants constructed on these lines are being successfully operated in connection with coke oven practice on the Continent, but the standard of results obtained, so far, is not quite equal to that required in the Gas Industry.

One other attractive line of investigation has for its object the production, at an economic price, of a sulphur free gas, the only waste products from which would be carbon dioxide and water. This would admit of a portable gas fire being used almost anywhere and it would also make practicable the total immersion burner for water heating, with a possible 100% thermal efficiency.

Quality of Gas.

While interesting ourselves in means of reducing the cost of production, we must not be unmindful of another important selling point—viz., quality. A fairly high standard is assured by statute in respect of pressure, calorific value, and freedom from the more obnoxious impurities, but the Industry has still a fair amount of latitude within which to improve upon this standard. Uniformity of pressure and calorific value are just as important as a working minimum; uniformity of specific gravity is also a desirable quality, and, as already stated, the reduction of the sulphur content deserves more attention than it receives.

In this respect, progress has not always been without its drawbacks, and economy has at times been obtained at the expense of quality; thus, while the substitution of oxide of iron for lime resulted in considerable economies in purification costs, the distribution of carbon dioxide and sulphur compounds in larger quantities had to be faced. No serious objection could be raised to the former except that it added unnecessarily to the distribution load, but the latter could not be regarded with equanimity since the elimination of sulphur in fuel of any kind is " a consummation devoutly to be wished for."

Similarly, the introduction of high-temperature carbonization, while it increased the thermal yield in gaseous form, led to naphthalene trouble; the elimination of this in turn led to the appearance of sulphuretted hydrogen in the gasholder tank water; and, in the same way, the elimination of condensable water vapour from the gas, although a great boon to the distribution engineer, has been responsible for a minor trouble in the form of gum. Another example which might be quoted is the varying specific gravity resulting from the use of carburetted water gas. This may not have increased the load on the distribution system appreciably, but it has necessitated the use of the adjustable burner which cannot be regarded as an unmixed blessing.

Happily, the aggregate result of these forward and backward movements has been, definitely, in a forward direction, and they have been quoted to indicate the close relationship between works and supply practice and the necessity for an intimate co-ordination of the two. Further, they indicate the importance of the chemical and physical sciences in the training of the gas engineer, and they also remind us that there are still works problems to be solved, still opportunities for invention and discovery, still scope for investigation and research, the " open Sesame " to Nature's hidden store of knowledge.

Distribution Problems—Service.

Reverting now to the distribution side, for reasons stated the Industry for long did not interest itself over-much in that part of its business which lay beyond the consumer's meter, gas being sold more or less on the " take it or leave it " principle and the consumer regarded as a liability rather than an asset. The late Thomas Newbigging, when reviewing the position at the beginning of the present century, wrote: " It is a remarkable fact that in the conduct of no other industrial concern is the consumer so completely ignored as in the administration of a gas undertaking," and he himself, a year or two later, when the seventh edition of his Handbook was issued, provided a striking example of this attitude by devoting 2 out of 529 pages to the use of gas for cooking, heating, and motive power.

A change was taking place, however. Each year competition threatened more and more the steady flow of business which the Industry had come to regard as a normal state of affairs, and gradually it awoke to the fact that the gas business was like any other business inasmuch as the customer's goodwill and consuming potentialities were assets which could be cultivated and developed, and the word " Service " was added to its vocabulary. The earliest tentative effort in this direction had for its object the provision of an adequate and uniform gas supply and an assured quality of workmanship in the carcassing of houses. This took the form of efforts to establish minimum standard sizes of meters and services and to obtain control over work done by outside contractors by a system of certification.

Later, the care and maintenance of the consumer's apparatus was discovered to be a form of service which the Industry might undertake with advantage. An interest in the design of apparatus followed, and utility, efficiency, appearance, accessibility, and safety became matters of importance.

More recently still, the possibility of new uses of gas for industrial purposes has led to the special study of industrial requirements and this movement has culminated in the establishment of the Industrial Development Scheme, the function of which is the organized intensive study of industrial problems, collaboration with makers in the design of special plant, and the collection, pooling, and distribution of all knowledge and experience relating to the use of gas for industrial purposes. The extension of this or a similar organization to deal with domestic practice can only be a question of time, for the ultimate aim of the Industry should be the perfecting of the consumers' apparatus and equipment and the elimination of the unsafe, the unsuitable, and the inefficient, even if this involves the standardization and certification of all domestic appliances in respect of performance and safety.

It is essential, therefore, that those engaged in the administration of the supply and utilization side of the Industry should possess a high degree of technical knowledge embracing the chemical and physical aspects of combustion in relation to special purposes, the principles of mechanics, heat transmission, air conditioning and venti-

lation, and such matters as the physiological aspects of light and heat; and there is ample scope for such, not only in dealing with the problems of the present but in planning for the future.

Unlike the works official, the supply official cannot contribute to the reduction in the cost of production, but he can contribute to the reduction in the price of gas to the consumer by giving sound advice as to the best method of utilization and by improving the efficiency of the appliances sold. The need for appropriate and adequate training has been recognized and provided for in the Education Scheme of The Institution of Gas Engineers, and it is only necessary to compare the Syllabus of to-day with that of 1908, when Supply first became a separate subject, to realize how rapidly and extensively the technique of Gas Supply Practice has developed.

Another indication of the change in outlook is the increasing number and range of Papers dealing with Supply Practice now being presented at meetings of the Technical Associations and the keen interest displayed in their discussion. Thus, at the last general meeting of The Institution of Gas Engineers, four out of six Papers were concerned with Supply problems.

Salesmanship.

So far, we have dealt with the technical aspect of Gas Supply and Service, but there is another aspect which concerns their marketing embracing salesmanship, publicity, and propaganda. These are equally modern in respect of technique and application, but fundamentally they are as old as mankind. One of the earliest episodes in history concerned an " Eat More Fruit " campaign which had, by the way, somewhat disastrous effects on man's subsequent history. The Patriarchs bargained with both God and man and in some of their transactions they could give points to the modern salesman.

Instances could be culled from history, down through the ages, to show that propagandists and salesmen are " born " and, given the opportunity, find means of exercising their talent. Even in the early days of the Industry such were not lacking and some of their efforts are worth recalling; for example, an advertisement for gas lighting reads as follows:

> " Illumination may be carried to the utmost extent of beauty and variegated fancy by this docile flame . . . affording to spectator an extraordinary and most delightful sight, cherishing the soul and creating good humour by meeting convenience, utility, and pleasure."

As we have seen, however, once established, business came to the Industry unsought, and the present-day competitive conditions, involving, as they do, both existing and prospective business, did not exist. Lack of interest in salesmanship was therefore no great reflection upon the Victorian manager who could show a steady 2½ to 5% annual increase in business and had no difficulty in paying the maximum dividend. Moreover, thrift, the cardinal virtue of Victorian individualism, did not encourage spending beyond the frugal standards of the day, and tentative efforts to introduce the insidious arts of modern salesmanship were looked upon with suspicion.

Times have changed, however. A modified form of socialism has taken the place of 19th century individualism; the State has assumed to a very great extent the family liabilities; and spending, instead of saving, is favoured by the present-day economist. Rival vendors of both the necessaries and the luxuries of life compete with each other, not only for the money the public has, but also for what it hopes to have.

The Industry has had to adapt itself to the change, and, once again, its contractor friends led the way 40 years ago by advertisement and by house-to-house canvassing for cookers and the free installation of fittings. Notwithstanding their example and those furnished by successful vendors of soap, cocoa, tobacco, and patent medicines who blazed the trail, it took the Industry some time to make up its mind; and it was not until 1911, when the British Commercial Gas Association was formed, that the Industry really got busy and developed sales consciousness. This has found expression, to an ever-increasing degree, in the cultivation of the arts of advertisement and salesmanship, the training of experts, the designing and equipment of showrooms, in lectures, demonstrations, and in the adoption of attractive systems of charging and of hiring and purchasing apparatus.

It is impossible to express the value of such services in pence per therm, but it is all the more important that those who thus serve shall possess a high standard of qualification.

For obvious reasons, where contact with the public is involved, personality, appearance, address, tact, and natural aptitude for the part are indispensable assets, but even these may be improved by systematic study under competent direction; it is equally important that they should have a background of sound knowledge concerning the construction and performance of the appliances sold and the relative merits of alternative services—and all that has already been said about technical education may here, once again, be taken as said.

Technical Education.

Notwithstanding the many signs of liveliness on the Supply front, however, the position is not altogether satisfactory. One of the symptoms which concern the Juniors is the comparatively small number of embryo gas engineers who are sufficiently interested in the technology of gas supply to qualify for the Institution's Diploma; thus, whereas 75 have qualified for the Diploma in Manufacture since the inauguration of the Institution Education Scheme, only five have qualified for the Diploma in Supply.

Various reasons have been offered to explain this anomaly and the following are the chief:

(1) While the diploma in Manufacture qualifies for membership of the Institution, that in Supply does not; hence the greater attraction of the former.

(2) The number of important executive positions open to the supply official is less than those open to the manufacturing official; hence again the incentive to qualify is less.

(3) Specialization is carried out to a much greater extent in supply than in works practice, and this prevents the student from obtaining the necessary experience.

(4) The scale of salaries paid on the manufacturing side is higher than that on the supply side, or, alternatively, the latter is not sufficiently high to encourage the young men in the Industry to " scorn delights and live laborious days "—and nights—in pursuit of any diploma.

Each of these reasons probably contains a certain amount of truth and, in the brave new world of the future which you are, I hope, going to create, all these anomalies will doubtless be eliminated—some are even now in course of being eliminated. I venture to suggest another reason, however—viz., that the Industry, notwithstanding all that has been said and done, is still lacking in a due appreciation of the importance of the technical aspect of supply and utilization, and it is this, more than anything else, which accounts for the lack of encouragement on the part of administrators and the lack of interest on the part of the students.

Since my audience is more representative of the students than the administrators, I suggest to those of you who aspire to positions of administrative responsibility that you should not be content to qualify for the Diploma in Manufacture alone, but, having done this, you should, as a matter of course, proceed to qualify for the Diploma in Supply as well. Indeed, since the Diploma is presumed to be the hallmark of the " compleat " gas engineer, a strong case could be made out for one diploma only for those who qualify in both sections; and that this is not beyond the capacity of the student was demonstrated last year by one of your own members.

To those who consider themselves handicapped to an extent which appears to justify contentment with lesser qualifications, I suggest that their conclusions are unwarranted. I am aware that the cult of Samuel Smiles, the tradition of the diligent apprentice and the soldier with the marshal's baton in his knapsack, is out-of-date, and I believe that to-day, more than ever before, " the tools are to those who can handle them " and promotion is by merit. Given personality and character, it will be earned by those who provide themselves with the necessary equipment rather than by those who expect to have a job guaranteed before commencing to train for it.

I doubt, however, whether the question of prospect or remuneration is, after all, a serious factor, and this, I think, is proved by those chiefly concerned—viz., the Juniors, and the wholehearted way in which they devote their time and energies to the many unpaid leisure time activities of the age, not the least outstanding example of which is the enthusiasm with which they support the Junior Gas Associations. I am not aware of any remuneration you receive other than that which is in the old-fashioned currency in which Virtue is said to figure, but it is a notable fact that each year you enrich the literature of the Industry with excellent Papers redolent of the midnight oil—or, rather, gas—you sacrifice your Saturday afternoons and travel long distances to attend your meet-

ings, even on occasions like the present, when the star turn is only a junior vice-president making a trial run.

Organization of the Industry.

The other direction in which the present position of the Industry is not altogether satisfactory is its organization. I am aware that this is a somewhat delicate subject and one which more particularly concerns your seniors, but I venture to offer a few closing remarks on the subject.

The leisurely growth of the Industry has already been commented upon. It followed no 5-years plan, but reflected rather the individualistic spirit of the Victorian era. As often as not the leading spirit was a local tradesman or professional man, a little more enterprising than his fellows. For years the lack of means of transport and communication prevented the fraternizing of those engaged in the Industry, and the only links between them were the contractors and consultants of the day. By the middle of the century, however, the need for co-operation found expression in the formation of the first Technical Association.

There is no need to tell a Scottish audience that it was their ancestors who led the way by forming first the Waverley Gas Association in 1861 and the North British Association in 1862. The Institution of Gas Engineers followed in 1863, then the District, and, more recently, the Junior Gas Associations and Salesmen's Circles.

For many years, the senior organizations, while concerned mainly with the technical side of the Industry, also provided the machinery for the discussion of other matters of common interest and for joint action when problems of a national character arose. These became too exacting, however, and with the advent of wartime conditions, the need for further organization and centralization led to the formation of the National Gas Council. Post-war conditions have but confirmed the wisdom of this step and emphasized the need for still more intensive organization within to meet the ever-changing conditions without.

To complete the story, reference might be made here to the private firms who have from first to last served the Industry, not only in supplying the plant it requires but in developing and perfecting both plant and processes, and some 170 of these, representing every phase of the Industry's activities, now form the Society of British Gas Industries. It is difficult to think of the Gas Industry with these excluded, and the formation of the British Gas Federation, some two years ago, gave expression to this identity of interest and opened up further prospects of future corporate activities in the interests of the Gas Industry as a whole.

The outstanding feature of the Industry's organization at present is the voluntary character of its membership and the democratic character of its executive bodies—and defects due to both of these characteristics are very much in evidence. The defect of the democratic is the necessity for compromise and the fact that the policy of the executive must always reflect the average and what is expedient rather than what is best; the defect of the voluntary is that it encourages the tendency to make the most of both worlds, by claiming all the benefits of corporate effort while retaining a maximum of freedom for individual and local action, the results of which may not always be compatible with the general good.

This is reflected in the diversity of statutory powers, of declared calorific value, of the methods of charging for both gas and apparatus, in the attitude towards group marketing of residuals and matters of policy generally, in the haphazard response made to the appeal for closer co-operation through amalgamations and group control, and the extent to which this has been left to the Finance Corporation whose main concern may not be the Gas Industry but the Finance Corporation.

Compare this with the organization of our chief competitor, the electrical industry. The electric grid is the last word in national planning for the wholesale production and distribution of electrical power by the most efficient equipment and most up-to-date methods. The McGowan Report, recently published, outlines further developments on the retail side, including standardization of systems, services, and charges, district group control, collective purchasing and publicity, and the exploration of every means of securing new business. This means more intensive competition in the future; and it seems obvious that only by organization on similar lines can the Gas Industry hope to meet such competition with success.

I do not propose to discuss the relative merits of voluntary organization and organization imposed by, say, a Gas Commission with similar powers to those of the Electricity Commission. My only excuse for joining the company of those who venture where angels fear to tread is to stress the view that the Industry must organize its forces and its resources to the fullest extent if it is to live and prosper: and the sooner the rising generation of gas managers acquires the proper attitude towards the subject, the better.

I can think of no better training ground than the Junior Gas Associations where men engaged in every Department of the Industry's activities and representing every type of Undertaking, municipal and company, large and small, urban and rural, meet, exchange views, pool knowledge and experience, and, above all, cultivate the spirit of friendship, goodwill, and mutual understanding, without which the free institution based upon voluntary and democratic principles will not avail.

To sum up, to those of you who would do the best for yourselves and for your Industry, I would say, equip yourselves by taking full advantage of the educational facilities at your disposal, add to the actual experience you are able to obtain the experience of others, through the medium of the Technical Press and the transactions of the technical associations, cultivate habits of observation and reflection whereby knowledge and experience may be translated into sound judgment, and, lastly, remember that while in unity there is strength, the efficiency of corporate effort lies not only in numbers, but in the spontaneous, wholehearted co-operation of the individual in the common cause.

Discussion.

The PRESIDENT (Mr. J. Webster, Port Glasgow), in welcoming Mr. Robertson, said that it was a great honour he had done the Association in addressing them.

Mr. A. DOW (President, Eastern District, Kirkcaldy) expressed the thanks of the Eastern District for the invitation extended to them. The Western District always provided a "star" item for such an occasion, and to hear the Vice-President of The Institution of Gas Engineers had indeed been a great pleasure. He noted Mr. Robertson's remarks regarding purification and the removal of sulphur, and he wished to know if Mr. Robertson could give comparative figures for the removal of sulphur by the present method and by the liquid purification method.

Mr. R. A. MCLAREN (Newton-on-Ayr) paid tribute to the speaker, and mentioned collective buying and amalgamations which were not always beneficial.

Mr. J. RICHMOND (Penicuik) thanked Mr. Robertson for the Address, but thought that the speaker had been a little hard on the Victorian managers' lack of enterprise and salesmanship. In regard to purification, he asked if it would not be better to revert to the old system of lime purification.

Mr. A. C. REA (Perth) stated that the Address had given a direct lead on a number of subjects for research. Regarding the distribution systems laid by Victorian managers, these were hopelessly inadequate to cope with present-day requirements, and one method of alleviating the trouble was to supply a higher C.V. gas. He had noted Mr. Robertson's remarks on the lack of students for Supply courses, and he was inclined to blame the Engineers and Managers for the state of affairs insofar as they did not provide proper opportunities for the students.

Mr. DAVID FULTON (Helensburgh) remarked that the Address was that of a thinker and contained many words of wisdom which the juniors would do well to study at their leisure. Touching on the question of research, Mr. Fulton said that The Institution of Gas Engineers did not have enough money to devote to research and therefore they had to concentrate on the main subjects and had to avoid as much as possible side issues. The removal of sulphur from gas was a big question, and concentrated efforts by all should be made to rid the Industry of this bogey. The uniformity of C.V. was not practical owing to the difference obtaining in coals all over the country and also from the economic point of view. Adverting to the examinations of The Institution of Gas Engineers, he said that some of the students were guilty of trying to evade the ancillary subjects, and he wished that they would realize that the knowledge of the main subject was built up on the ancillary subjects.

Mr. A. S. NISBET (Paisley) said he was particularly interested in the removal of sulphur. He had gone into this matter a few years ago and he was of the opinion that the American method of purification would not be approved by the authorities here. Touching on the recent electrical reports, Mr. Nisbet said that the electrical industry was endeavouring to have unified and centralized control. If this materialized then some benefit might accrue to the Gas Industry because prices for electrical energy would be levelled out, resulting in increases to consumers who were favoured at the moment. This increase in price might swing the pendulum in favour of gas.

Mr. ROBERTSON, in reply, observed that in connection with sulphur removal no complete purification plant on new lines had given the desired economic conditions. He instanced two cases and said that neither could show a satisfactory saving. As to group buying and centralization, Mr. Robertson said that theoretically this was the ideal state, but too much depended on the human element. The McGowan Report was far-sighted, and the Gas Industry must take it seriously. There was no doubt that certain interests were trying hard to electrify the whole of the railway systems, and if this came to pass he doubted whether in the levelling of prices there would be the advantage envisaged by Mr. Nisbet. He thought the Victorian managers did show a lack of interest and appreciation of the true worth of a consumer, and that their work ended when a consumer had a good supply and good burners. He would not like to go back to the old lime purification, and he was apprehensive of what would be said if he started carting thousands of tons of evil-smelling spent lime through the streets of Bristol. He agreed that they had too little money to spend on research and hoped that things would improve in the future.

Trade Notes

Sternol, Ltd.: Fiftieth Birthday.

We have received a copy of a handsome brochure, "The House of Sternol, 1886-1936," which has been published to mark the fiftieth birthday of Messrs. Sternol, Ltd., the oil refiners and lubricant manufacturers. Founded in 1886, the firm have built up a world-famous reputation and their products are being used all over the globe, on land and sea. They are suppliers to most of the British Government Departments and the leading industrial organizations in this country and abroad.

Turners Asbestos Company: New Publications.

Two publications, which we have recently received from Messrs. Turners Asbestos Company, Trafford Park, Manchester, 17, deal with the firm's flue pipes and fittings and "Turnall" glazed panels. The first of these two publications deals with a vast array of the firm's productions. The second shows the decorative possibilities of "Turnall" glazed tiles. These tiles are composed of specially prepared "Poilite" asbestos-cement sheets finished with a high glaze which is claimed to be permanent, exceptionally hard, non-brittle, and has extraordinary resistance to varying temperatures and moisture. The makers state that there is no other decorative surface possessing the same qualities available in such a large sheet, while a very attractive range of designs, including plain colours and marble types, enhances the decorative possibilities of this material.

Vacuum Cleaning on the Gas-Works.

For fourteen years the tops of the retort benches at the Beckton Works of the Gas Light and Coke Company have been cleaned by vacuum. The apparatus for this work was supplied by the British Vacuum Cleaner and Engineering Company, Ltd., London, S.W. 6, about the year 1922, and in a modified form, but the same in principle, this plant is still performing the same duty. The Firm considers that this is evidence that its application is the means of saving considerably in the time and expense of cleaning down the bench.

In 1933 the B.V.C. supplied a central installation on the coal-conveying equipment of the coking plant at Beckton. In this system all the belt conveyor tunnels were piped with hose points at about 40-ft. intervals throughout, to which flexible hose could be attached for clearing up the fine coal dust which settles on floors and ledges, forming a possible source of danger and waste.

Then this year a similar plant was supplied to the Gas Light and Coke Company for a similar purpose in the coal conveyor tunnels at Beckton which distribute coal from the unloading jetty on the river to the various points of storage and delivery which are spread over a wide area.

The B.V.C. have at the present time under construction a dust removal plant for one of the boiler houses at Beckton, but in this case the dust consists of the grits collected by a Davidson cyclone grit catcher, the grits being removed from the base of the grit catcher and deposited into an airtight container for discharge into a storage hopper whence they are, at intervals, removed in wagons.

Other portable cleaners have been supplied to the same Company for their works at Nine Elms, Brentford, and Southall for general cleaning at certain points in the works.

Other machines of this type have also been supplied to the gas undertakings at Birkenhead, Birmingham, and Reading.

The B.V.C. claim that this system of keeping down the dust nuisance is steadily receiving the attention of gas undertakings, and accomplishes work that cannot be done satisfactorily by any other method.

New Premises for Bristol's Instrument Company, Ltd.

A very large increase of business during recent years has necessitated the Bristol's Instrument Company, Ltd., moving to larger and more up-to-date premises at Brent Crescent, North Circular Road, N.W. 10. The new factory is well equipped with

A Section of the Bristol's Instrument Company's New Works.

the necessary machinery and tools for the manufacture and fabrication of cases and all necessary parts for industrial indicating, recording, and control instruments, and also with all essential standards for temperature, pressure, and vacuum calibration. There is also ample room for extension of the works, should this be necessary later.

Stanton "New" Spun Iron Pipes.

It is claimed that the Stanton "New" spun iron pipe represents the most important development that has taken place in the manufacture of cast-iron pipes since the introduction of centrifugal casting.

In their latest publication on the subject, the Stanton Ironworks Company, Stanton, nr. Nottingham, point out that by a combination of two well-known processes, they have produced a pipe with the dense uniform structure and high tensile strength of the original "Delavaud" centrifugally-cast pipe, *plus* an entirely new property—namely, an increased ductile strength, producing an impact resistance considerably higher than that obtainable on the standard cast-iron pipe of greater thickness. This added property is secured by using during manufacture a specially treated steel mould in which the pipe can be cast without chill. This new process, it is claimed, makes it possible, for the first time in metallurgical history, to increase the ductile strength of cast-iron pipe without loss of tensile strength.

The risk of damage during transport, handling, and laying is thus reduced to a minimum. In addition, the pipes when laid offer a much higher resistance to sudden stress and impact.

At Ascot's Christmas Party

The above photograph was taken at the Annual Christmas Party of Ascot Gas Water Heaters, Ltd., when some thousand members of the staff and their friends were entertained at the Porchester Hall, Bayswater. Reference to this enjoyable function was made in last week's "JOURNAL."

Review of the General Meeting of the Union Syndicale de l'Industrie Technique du Gaz en France

(*Continued from p. 798.*)

Steaming in Intermittent Vertical Retorts and Chambers

At Verdun, installations both of intermittent vertical retorts and chambers are available. The former take a 6 cwt. charge, while the latter are of 24 cwt. capacity. Modifications introduced to the plants with a view to their adaptation to steaming and, in the latter case, to the manufacture of carburetted water gas were described by A. Mollard.

As regards the retorts, a special patented steam distributing box was built into the bottom doors, highly superheated steam being introduced into the retorts for 4 hours at the end of the 10-hour carbonizing period, the amount of steam representing 10% by weight of the charge.

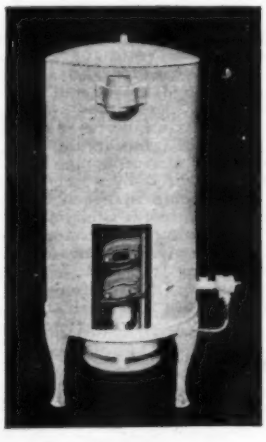
The intermittent chambers were reconstructed in their bottom sections to enable steam to be superheated in flues built into the setting and to be passed into the charge through ports at the bottom of the chamber side-walls. A special connecting piece was bolted to an end wall of each chamber with branches leading to the two steam flues of the chamber. The steam valves are of the two-way type and enable a change over from low steaming to high steaming to be effected. In the first 9 hours of the 12 hours' cycle, the steam serves as a scavenging medium and is introduced at the rate of 0·14% per hour on the weight of the charge. During the final 3 hours, the rate of steaming is 3% per hour on the weight of the charge. The effect of continuous scavenging with steam is regarded as beneficial in increasing the yield of gas and reducing the content of inerts.

Carburetting is effected in the intermittent chambers by introduction of atomized light fuel oil into the free space at the top of the charge. Originally, the fuel oil, atomized by means of steam, was introduced through a charging hole. The arrangement was subsequently modified, the oil spray being introduced through a hole provided at the end of the chamber. The oil is contained in a portable receptacle holding about 8 gallons and provided with a gauge glass, a special type of portable steam atomizer being employed. The carburetting medium, in amount equal generally to 6·6·7 gallons per ton of coal or to as much as 8 gallons per ton of coal, is introduced with steam equivalent to 1·4% by weight of the coal during a period of 1½ hours. Temperatures in the free space are 900° C. before admission of oil commences, 620° C. one hour later, and 560° C. at the end of the operation. In the production of gas having a calorific value of 471 B.Th.U. per cu.ft. at 60° F., 30 in., saturated, the yield is 17,300 cu.ft. per ton when steaming only is practised, and may reach as high a figure as 20,000 cu.ft. per ton when steaming is associated with carburetting.

High-Pressure Distribution of Gas at Lille

Lille and its surroundings have been supplied with coke oven gas from the Pas de Calais district since 1929. A programme of modernization in the distribution system was undertaken in 1934 and involved the elimination of all the holders save two. The new system was described by P. Bidart.

The receiving station for the coke oven gas is at the old Loos works, where the necessary meters and boosters, as



Something

NEW

IN STORAGE WATER HEATERS

THE Spiral Thermal Storage Set comprises a hot-water storage cylinder with a cast-iron boiler connected on the well-known Potterton system, but in this instance, the boiler section is within the cylinder, forming a compact unit of medium power.

A feature of this set is that the gas products do not come in contact with any part of the cylinder and all parts of flues and waterways are easily accessible for cleaning.

Supplied in three sizes, 20, 25, and 30 gallons; gas consumption 30 cubic feet per hour, and the set can be used without a flue where necessary.

THOMAS POTTERTON (Heating Engineers) LTD.
BALHAM, LONDON, S.W. 12

well as a carburetted water gas plant, have been installed. The purpose of the latter is twofold. A certain amount of carburetted water gas is always mixed with the coke oven gas to adjust the calorific value to a constant figure. In practice, the maximum variation in the calorific value of the gas is restricted to ± 2 B.Th.U./cu.ft. The carburetted water gas plant also serves as a standby which enables any deficiency in the amount of coke oven gas to be made good. From Loos proceeds a feeder main encircling Lille, and an offshoot therefrom carries a supply of gas to Armentières. An old booster station at the inlet of this branch has been retained in case of need. At Marquette, a point on the feeder main remote from Loos, is a holder station equipped with boosters and, at convenient situations along the main, a series of district expansion valves has been provided.

The booster house at Loos contains three Baudot-Hardoll boosters. A large machine having an hourly capacity of 200,000-280,000 cu.ft. is driven by means of a 3-cylinder variable-speed gas engine of 90 H.P., and the two smaller machines each having an hourly capacity of 120,000 cu.ft. are driven from 37-H.P. electric motors. The gas is boosted from a pressure of 6 in. W.G. to a pressure of 83 in. W.G.

The control panel is fitted with an indicator which registers the level of the Loos holder, the dial of the calorimeter which registers the calorific value of the mixed gas, a ring-balance meter which indicates the rate of flow of the compressed gas, recording and indicating pressure gauges which register the pressure of the gas in the feeder main and, finally, the necessary electrical equipment such as meters, starters, &c.

The safety appliances comprise:

(1) A back-pressure valve which can be set at any desired pressure.

(2) Non-return valves at the outlet of each booster. These valves are very useful since they eliminate the need for any manual operation of valves when a new booster is started up, and, moreover, they enable a booster to be put into commission while not subjected to back pressure; hence the starting current is considerably reduced.

(3) An automatic by-pass with a balanced valve connected across the inlet and outlet mains opens up the holder to the feeder main in the event of any interruption to the operation of boosting. This by-pass does not function reversibly and must be reclosed by hand; hence any faulty manœuvre is impossible.

(4) A holder-level indicator which operates a klaxon in the event of the holder becoming nearly emptied and, if the warning is unheeded, cuts out the magneto of the gas engine and thereby prevents the booster from sucking from an empty holder.

The feeder main system, including the 9-mile supply main to Armentières, has a length of 23 miles.

The 1,000,000 cu.ft. holder at Marquette is filled during off-peak hours by means of an automatic valve. To ensure that the pressure in the feeder main never falls below that of the holder, as it would, for example, if the boosters at Loos were arrested, an automatic by-pass connects the feeder main to the holder outlet. The holder station possesses a booster capable of delivering 140,000 cu.ft. of gas per hour from the holder to the feeder main and is put into operation either if the Loos station is idle during a peak consumption period or if repairs have to be effected at the Loos end.

In the Lille district, there are more than 400 miles of mains. The hourly rate of gas consumption varies very widely from a maximum of 280,000-350,000 cu.ft. during peak periods to a minimum of 18,000-28,000 cu.ft. at night. To ensure constancy of pressure, clock controlled district governors with double valves were adopted. Some of these are of the double bell type with oil seals. Others are of the double diaphragm type. To prevent the latter from being thrown out of action through frost, they can be electrically heated by means of 750-watt heating elements supplied with 220 volt current. Each governor station is equipped with pressure recorders.

The whole system is so mechanized that the distribution of more than 1,400 million cu.ft. of gas per annum to a populace of 420,000 is controlled by a single individual at the Loos booster station.

(To be continued.)

ALWAYS IN STOCK

STANTON

"NEW" SPUN IRON PIPES

3 inch diameter in 12 feet lengths.

4 inch to 12 inch diameters in 12 ft. and 18 ft. lengths.

VERTICALLY-CAST IRON PIPES

3 inch diameter in 9 feet lengths.

4 inch to 12 inch diameters in 9 ft. and 12 ft. lengths.

15 inch to 24 inch diameters in 12 feet lengths.

The Stanton Ironworks Company Limited, Near Nottingham

There would be no point in advertising Simmance Patent Dead-Beat Indicators and Recorders if every Gas Works was equipped to saturation point. It is because so many works are equipped and continue to find further uses for these instruments—and because so many other Engineers could use them with advantage—that we continue to advertise this very popular series of Gas Works Instruments.

The metal diaphragms used in these instruments for pressures and vacuum up to 5 lbs. per square inch (lowest range 0-1" W.G.) are resistant to foul gas.

ALEXANDER
WRIGHT & CO., LTD.
WESTMINSTER. S.W.1

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

Markets closed on Thursday last in a buoyant mood after four days of good business, the activity continuing almost up to the last hour of opening. Gilt-edged stocks were steady, and Home Rails hardened in anticipation of larger Christmas traffic receipts. Perhaps the greatest activity centred round metals and commodities on account of their increased prices, particularly was this the case with copper and lead, while rubbers also strengthened for the same reason. Oils were active and closed firm. Industrials became somewhat quiet with few features, though prices on the whole were well maintained. Everything points to a resumption of activity when markets open for the current week.

There was very little business done in Gas stocks and shares. Investors requiring permanent holdings do not as a rule bother overmuch about these a few days before the Christmas holidays, with the result that this market is somewhat neglected. Quotations, therefore, remained practically unchanged, though in comparing the prices of recorded transactions with those of the previous week it will be noticed that the majority were put through at slightly higher levels. One important exception is that of Commercial ordinary, several parcels of which changed hands at the low price of 93. It is true that during the past few years this Company has made big inroads into its carry-forward, but this has been necessitated mainly by heavy expenditure chiefly of a non-recurring nature—*e.g.*, the enamelling of black cookers, &c.—and with the maintenance of receipts from gas and residuals there is every reason to assume that at least the basic rate of 5% will continue to be distributed, in which case the yield at the above price is a high one at £5 7s. 6d.%.

Current Sales of Gas Products

The London Market for Tar Products.

Dec. 28.

There are no changes to record in the values of Tar Products, which remain as quoted on Dec. 21, namely:

Pitch, nominal at 34s. per ton f.o.b.
Creosote, 5¾d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 7d.; 90/160 pyridine, 7s. 3d. to 7s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Dec. 28.

The average prices of gas-works products during the week were: Gas-works tar, 18s. 3d. to 23s. 3d. Pitch—East Coast, 31s. to 33s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 33s.* Toluole, naked, North, 1s. 11d. to 2s. Coal tar crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 5d.; low gravity, 4½d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 7d. to 2s. 8d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Dec.* 26.

Prices of almost all products remain steady although, with holidays, there is not the same interest being taken.

Crude gas-works tar.—The actual value is 34s. to 35s. per ton *ex* works in bulk.

Pitch remains rather dull at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar continues to be held for 3d. per gallon f.o.r. for export, and 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—With many sales already completed, makers are firm with regard to further supplies as follows: Specification oil, 5d. to 5¼d. per gallon; low gravity, 5d. to 5½d. per gallon; neutral oil. 4¾d. to 5d. per gallon; all *ex* works in bulk.

Cresylic acid.—Enquiries continue numerous with supplies scarce. The following prices are nominal: Pale, 97/99%, 2s. 5d. to 2s. 7d. per gallon; dark, 97/99%, 2s. 2d. to 2s. 4d. per gallon; and pale, 99/100%, 2s. 9d. to 3s. per gallon; all *ex* works in buyers' packages.

Crude naphtha continues to change hands at 5½d. to 6d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is a little lower at 1s. 4d. to 1s. 4½d. per gallon, but 90/190 heavy naphtha is unchanged at 11d. to 1s. per gallon.

Motor benzole is offered at 1s. 2½d. to 1s. 3d. per gallon.

Pyridines.—Prices are nominal at 6s. to 6s. 6d. per gallon for 90/160 grade, and 7s. to 7s. 6d. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole . . .	0 8½	to	0 9	per gallon at works
Motor ,, . . .	1 2	,,	1 2½	,, ,, ,,
90% ,, . . .	1 3	,,	1 3½	,, ,, ,,
Pure ,, . . .	1 7	,,	1 7½	,, ,, ,,

Contracts Advertised To-Day

Air Compressor.

Stoke-on-Trent Corporation. [p. 920.]

Pipes.

Hoylake Gas Department. [p. 920.]
Windermere Gas and Water Department. [p. 920.]

Diaries, Calendars, &c., Received

Seasonable gifts in the shape of useful diaries, calendars, &c., have been received from the undermentioned friends, whose good wishes are heartily reciprocated:

British Thermostat Company, Ltd.
Crossley Brothers, Ltd.
R. & J. Dempster, Ltd., Manchester.
Gas Meter Company, Ltd.
Imperial Chemical Industries, Ltd.
Oxley Engineering Company, Ltd.
Peebles & Co., Ltd.
W. C. Smithie & Co., Ltd.
Willey & Co., Ltd.

Gas Undertakings' Results

Edinburgh.

At a meeting of the Public Utilities Committee of the Edinburgh Corporation on Dec. 18, Mr. James Jamieson, Engineer and Manager of the Gas Department, reported that the quantity of gas supplied during November amounted to 383 million cu.ft., compared with 370 million cu.ft. for the same month last year, an increase of 13 million cu.ft., or 3·4%. This is by far the largest monthly quantity of coal gas produced in Edinburgh. Since the beginning of the present financial year the gas consumed amounts to 1,746 million cu.ft., compared with 1,670 million last year, an increase of 76 million cu.ft., or 4·5%. These increases are encouraging, keeping in mind the progress made by the Department since the coal strike of 1926, the gas used in Edinburgh having increased by 646 million cu.ft. per annum, or 20%, notwithstanding the very material improvement in the efficiency of apparatus. During the month of November, approximately 1,400 cooking appliances, 500 fires, and 300 refrigerators and water heaters were supplied and fitted, a total of 2,200 appliances. This represents an average of nearly 100 per full working day, or over 12 appliances fitted per working hour. The total number of cooking appliances on loan from the Department is over 70,000; on hire, 9,000; and on hire-purchase, 21,000. The number of appliances fitted since May 15 last is 11,000—a record in the history of the Department. At the present time the demand for appliances is unprecedented, and notwithstanding a largely augmented staff the resources of the Department are being taxed to the utmost in coping with the demand.

Gas and coke production with the best advantages of scientific control . . . .

THE WEST SYSTEMS

- GLOVER-WEST VERTICAL RETORTS
- WESTVERTICAL CARBONIZING CHAMBERS
- COAL AND COKE-HANDLING & PREPARATION

Carbonizing Plants ordered in 1936 by—

THE **DUDLEY,** BRIERLEY HILL & DISTRICT GAS CO. (3RD ORDER)
THE **KELSO** GAS COMPANY, LTD.
THE **ALTRINCHAM** GAS COMPANY (3RD ORDER)
THE **BILSTON** GAS LIGHT & COKE COMPANY (2ND ORDER)
THE **GRANGEMOUTH** CORPN. GAS DEPT. (2ND ORDER)
THE **JOHANNESBURG** MUNICIPAL GAS DEPT. (3RD ORDER)
THE **BALLYMENA** U.D.C. GAS DEPARTMENT (2ND ORDER)
THE **WORCESTER** NEW GAS LIGHT CO. (2ND ORDER)
THE **YEADON AND GUISELEY** GAS CO. (2ND ORDER)
THE **CARLISLE** CORPORATION GAS DEPT. (2ND ORDER)
THE **DUMBARTON** CORPORATION GAS DEPT. (2ND ORDER)
THE **BELFAST** CORPORATION GAS DEPT. (6TH ORDER)
THE **DUDLEY,** BRIERLEY HILL & DISTRICT GAS CO. (4TH ORDER)
THE **GALASHIELS** GAS LIGHT COMPANY
THE **CHARD** CORPORATION GAS DEPARTMENT

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING 'Phone: COLLYHURST 2961 : 'Grams': "STOKER, MANCHESTER"

LONDON: COLUMBIA HOUSE, ALDWYCH, W.C.2 'Phone: HOLBORN 4108 : 'Grams': "WESGASCO, ESTRAND, LONDON"

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Dec. 22	Rise or Fall on Week	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Sept. 7	7⅜	8	Alliance & Dublin Ord. ...	167—172	...	...
374,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	92—97*	...	...
557,655	,,	Aug. 10	7	7	Barnet Ord. 7 p.c.	168—173	...	...
300,000	1	Oct. 5	1/9⅞	1/4½	Bombay, Ltd.	26/—28/-	...	...
179,305	Stk.	Aug. 10	9½	9½	Bournemouth sliding scale ...	220—230	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	171—176	+1	175—176
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	148—153	...	...
50,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	85—90*	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	104—109*	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	123—128*	...	...
357,900	,,	Aug. 10	7½	7½	Brighton, &c., 6 p.c. Con. ...	168—173	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	154—159	...	...
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	145—150	...	148
855,000	,,	Oct. 5	8	7	British Ord.	157—162	...	...
100,000	,,	Dec. 14	7	7	Do. 7 p.c. Pref.	148—153*	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113*	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100*	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—114*	...	...
200,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—102*	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	June 22	4½	4½	Do. 4½ p.c. Deb. ...	80—85	...	...
626,860	,,	July 20	6	6	Cardiff Con. Ord.	128—133	...	...
237,860	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb.	108—113*	...	...
98,936	1	Oct. 19	2/-	2/-	Colombo Ord.	1⅜—1⅝	...	...
24,510	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
609,204	1	Oct. 5	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/6—19/6	...	...
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref	21/—23/-	...	...
1,775,035	Stk.	Aug. 10	5	5	Commercial Ord.	93—98	...	93
620,000	,,	Nov. 30	3	3	Do. 3 p.c. Deb. ...	83—88	...	84
286,344	,,	Aug. 10	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
807,560	,,	Aug. 10	7	7	Croydon sliding scale ...	158—163	...	161½—162½
644,590	,,	,,	5	5	Do. max. div.	115—120	...	119
620,385	,,	Dec. 14	5	5	Do. 5 p.c. Deb.... ...	123—128*	...	...
239,000	,,	Aug. 10	5	5	East Hull Ord. 5 p.c.... ...	108—111	...	...
184,555	,,	Aug. 10	6	6	East Surrey Ord. 5 p.c., ...	128—133	...	...
176,211	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	121—126*	...	...
250,000	1	Nov. 16	4	4	Gas Consolidation Ord. ...	20/6—22/6	...	...
250,000	1	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19/—21/-	...	20/3
19,284,128	Stk.	Aug. 10	5⅞	5⅞	Gas Light & Coke 4 p.c. Ord.	26/—27/-a	...	26/6—27/-
2,400,000	,,	,,	3½	3½	Do. 3½ p.c. max.... ...	89—92	...	88
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	104—108	...	104½—106
8,602,497	,,	Nov. 30	3	3	Do. 3 p.c. Con. Deb. ...	83—86	...	83½—85
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	116
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	114—117	...	114½
700,000	,,	Sept. 7	...	25.5§	Do. 3½ p.c. Red. Deb. ...	102—10	...	...
270,466	,,	Aug. 24	6	6	Harrogate New Cons.	128—133	...	...
213,200	,,	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	133—138	...	...
5,600,000	,,	Nov. 2	12	8	Imperial Continental Cap. ...	145—150	...	147½—149¾
223,130	,,	July 20	3½	3½	Do. 3½ p.c. Red. Debs.	92—97	...	...
285,242	,	Aug. 24	8½	8½	Lea Bridge 5 p.c. Ord. ...	183—188	...	...
11,751	,,	,,	10	8	Maidstone Gas 5 p.c. Cap. Stk.	190—200	...	...
63,480	,,	Dec. 14	3	3	Do. 3p.c.Prp.Db.Sk	79—84*	...	...
75,000	,,	Nov. 30	†10	†10	Malta & Mediterranean ...	185—195*	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Aug. 24	5	5	M.S. Utility 'C' Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	103½—105½
360,075	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	103—108*	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	121—126*	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	97—100	...	...
675,000	Stk.	Nov. 16	†6	†6	Montevideo, Ltd.	75—80	...	78½
225,000	,,	Aug. 10	7½	7½	North Middlesex 6 p.c. Con.	170—175	...	...
396,160	,,	Aug. 10	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Nov. 2	†7	†9	Oriental, Ltd....	168—173	...	169
416,617	,,	Dec. 14	8	8	Plymouth & Stonehouse 5 p.c.	165—170*	...	—
504,416	,,	Aug. 10	8½	8½	Portsmouth & Gosport Cons.	178—183	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	114—119	...	...
73,350	,	,,	...	5	Do. 5 p.c. Pref. ...	118—123	...	...
363,470	1	Sept. 21	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...	...
454,510	1	,,	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	21/—23/-	...	22/3—22/9
133,201	Stk.	Aug. 24	8	8½	Shrewsbury 5 p.c. Ord. ...	145—150	...	...
90,000	10	June 8	13½	14	South African...	4—5	...	...
1,152,635	1	Sept. 7	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	27/—29/-	...	...
845,511	1	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	21/—23/-	...	...
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	20/6—21/6	...	...
150,000	Stk.	Aug. 10	...	3½	Do. 3½ p.c. Red. Deb. ...	100—102	...	...
6,709,895	,,	Aug. 10	6½	5	South Met. Ord.	113—116	+½	114—116
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf....	145—150	...	145—146½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf....	104—107	...	...
1,895,445	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	83—86*	...	...
1,000,000	,,	July 6	5	5	Do. 5 p.c. Red. Deb.	114—117	...	116 3/16—116¾
1,543,795	,,	Aug. 10	6	6	South Suburban Ord. 5 p.c....	130—135	...	133
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	121—126	...	125¾
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	102—107	...	...
888,587	,,	Dec. 14	5	5	Do. 5 p.c. Deb....	122—127*	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	101—106*	...	...
427,859	1	Nov. 16	1/2½	9¾	S. Western Gas & Water Ord.	21/—23/-	—⅛	...
160,523	1	Oct. 19	-/10½	-/10½	Do. 4½% Red. Cum. Pref.	20 6—22/6	...	...
110,000	Stk.	Dec. 14	4	4	Do. 4% Red. Deb. ...	100—105*	...	...
647,740	,,	Aug. 10	5½	5	Southampton Ord. 5 p.c. ...	112—117	...	...
121,275	,,	June 8	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Aug. 10	5½	5½	Swansea 5½ p.c. Red. Pref. ...	112—117	...	...
106,000	,,	June 8	6½	6½	Do. 6½ p.c. Red. Deb. ...	98—101	...	...
94,000	,,	,,	§35/-	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Aug. 10	6½	6½	Tottenham and District Ord.	152—157	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	130—135	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
371,850	,,	Nov. 30	4	4	Do. 4 p.c. Deb. ...	102—107	...	...
369,774	,,	Aug. 10	7	7	Uxbridge, &c., 5 p.c. ...	165—170	...	...
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
1,340,521	,,	Aug. 10	7	7	Wandsworth Consolidated ...	159—164	...	...
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	123½
500,000	,,	,,	...	...	Do. 4 p.c. Pref. ...	104½—107½	...	...
1,317,964	,,	Dec. 14	5	5	Do. 5 p.c. Deb. ...	125—130*	...	127—128
338,300	,,	,,	4	4	Do. 4 p.c. Deb. ...	102—107*	...	...
499,735	,,	Aug. 10	7¼	7	Watford and St. Albans Ord.	157—162	...	159—160
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
200,000	,,	Dec. 14	4	4	Do. 4 p.c. Red. Deb.	100—105*	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb.	99—102*	...	...
158,400	,,	Aug. 24	6b	5½	Winchester W. & G. 5 p.c. Con.	120—125	...	...

a.—The quotation is per £1 of Stock. b.—Paid £3, including 10s. on account of back dividends. * Ex div.
† Paid free of income-tax. ‡ For year. § Actual.

Stock and Share List continued overleaf.

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STOCK AND SHARE LIST—Cont.

Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Dec. 24.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 20	6	5	Bath Cons.	125—127	...	...
1,647,250	,,	July 6	5	5	Bristol, 5 p.c. max.	118—120	...	...
120,420	,,	Dec. 14	4	4	Do. 1st 4 p.c. Deb. ...	101½—103½*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101½—103½*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—125*	...	...
274,000	,,	Aug. 10	5	5	Newport (Mon.) 5 p.c. max....	110—114	...	...
13,200	12	Sept. 7	8⅓	7	Pontyp'l Gas & W. 10 p.c. 'A.'	13½—14½	...	...
12,600	10	,,	6	5	Do. 7 p.c. B.'	12—12½	...	...
40,000	10	,,	6	5	Do. 7 p.c. 'C.'	12—12½	...	...
140,778	Stk.	Aug. 10	5	5	Weston-super-Mare Cons. ...	112—114	...	...
64,338	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	98—101*	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	160—163*	...	...
LIVERPOOL EXCHANGE.								
187,180	Stk.	Aug. 10	6½	5	Chester 5 p.c. Ord.	107—112	...	...
92,500	,,	Dec. 14	4	4	Do. 4 p.c. Pref.	98—102*	...	...
82,540	,,	,,	3½	3½	Do. 3½ p.c. Deb. ...	90—95*	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	99—103*	...	...
2,167,410	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	132—134	...	...
245,800	,,	Dec. 14	5	5	Do. 5 p.c. Red. Pref ...	101—106*	...	...
306,083	,,	July 6	4	4	Do. 4 p.c. Deb. ...	104—106	...	...
106,280	,,	July 20	10	10	Preston 'A' 10 p.c. ...	198—208	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	137—147	...	...
NEWCASTLE EXCHANGE.								
122,877	Stk.	Aug. 10	8	8	Blyth 5 p.c. Ord.	164—166	+11	165
782,000	,,	Aug. 10	5	5	Hartlepool G. & W. Co. & New	125—127	...	...
2,061,318	,,	Aug. 10	5½	5	Newcastle & Gateshead Con.	127/—27/6a	—/9	...
682,886	,,	,,	4	4	Do. 4 p.c. Pref. ...	104—105	...	...
776,706	,,	June 22	3½	3½	Do. 3½ p.c. Deb. ...	100—102	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
209,820	,,	Aug. 10	8½	8½	South Shields Con.	172—174	...	...
299,542	,,	Aug. 10	6	6	Sunderland 6 p.c. max. ...	140—142	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 10	10	7	Derby Con.	185—195	...	...
55,000	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	100—105*	...	...
84,730	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	...	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	...	...	...
20,000	10	Dec. 14	5	5	Do. 5 p.c. Pref. ...	10—12*	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	117—122*	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Aug. 10	10	10	Great Grimsby 'A' Ord. ...	220—230	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	220—230	...	...
79,008	,,	,,	10	10	Do. 'C' Ord. ...	205—215	...	...
1,806,339	,,	Aug. 24	6	6	Sheffield Cons.	146—148	...	...
95,000	,,	July 6	4	4	Do. 4 p.c. Deb.	102—105	...	...

a The quotation is per £1 of Stock.

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Nov. 2	5	25/-a	Ascot Ord.	118—123	...	...
128,182	,,	July 6	...	5	Do. 5 p.c. Pref.	115—120	...	...
312,083	1	Nov. 16	5	5	Asd. Gas and Water Ord....	20/6—22/6	...	22/9—23/-
326,071	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-	...	...
150,000	Stk.	Sept. 21	...	3½	Do. 3½ p.c. Red. Deb. ...	98—101	...	...
17,000	,,	Aug. 24	8	8	Bognor Orig. Ord. 'A' ...	175—185	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	175—185	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	145—150	...	...
37,440	,,	Aug. 10	10	10	Cam.Univ. & Town 10 p.c.max.	205—215	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	155—160	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	108—113	...	...
65,000	,,	Aug. 10	8⅓	7½	Eastbourne 'A' 5 p.c. ...	175—180	...	...
198,800	,,	,,	7	6	Do. 'B' 3½ p.c. ...	142—147	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
130,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	122—127*	...	124
24,000	30	Aug. 10	8½	8½	Great Yarmouth 8½ p.c. max.	51—56	...	...
89,400	30	,,	7½	7½	Do. 7½ p.c. max.... ...	42—45	...	...
81,160	Stk.	Dec. 14	5½	5½	Do. 5½ p.c. Deb.... ...	123—128*	...	...
182,600	,,	Sept. 7	8	8	Guildford Cons.	220—230	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	114—119	...	...
48,250	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	120—125*	...	...
156,600	,,	Aug. 24	7½	7½	Hampton Court Cons. ...	173—178	...	...
107,960	10	Oct. 5	5½	4	Mid Kent Ord.	10—11	...	...
230,940	Stk.	Aug. 10	10	10	Oxford & District Ord. ...	215—225	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pre ...	113—118	...	...
126,193	,,	Nov. 16	7½	7½	Peterborough Ord.	162—172	...	...
64,990	,,	Sept. 7	6½	7½	Redditch Ord.	133—143	...	...
166,850	,,	Aug. 10	9	8	Romford Ord.	168—178	...	174—176½
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Sept. 21	5	5	Do. 5 p.c. Deb.	120—125	...	...
10,950	,,	Aug. 24	8	8	Ryde Ord.	165—170	...	...
136,191	,,	Aug. 10	7	5	Scarborough Ord.	126—136	...	...
27,825	,,	Aug. 24	8	8	Shanklin & Ventnor Cons. ...	180—190	...	...
40,643	,,	Sept. 21	7	7	Slough Ord.	156—161	...	...
221,000	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	116—121*	...	...
28,872	1	Nov. 2	5½	5½	S. Midland Gas Cpn.Ltd. Ord.	22/—24/-	...	...
28,866	1	Sept. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	22/—24/-	...	...
137,730	Stk.	Aug. 10	7	7	Southgate & Dist. 7 p.c. max.	151—156	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	120—125	...	...
117,228	,,	Aug. 10	6	5	Swindon Cons.	110—115	...	...
60,425	,,	Dec. 14	5	5	Do. 5 p.c. Deb.	118—123*	...	...
64,380	,,	Dec. 14	5	5	Torquay and Paignton 5 p.c. Pf.	115—120*	...	...
750,000	1	Oct. 5	5·52d.a	4	Utd. Kingdom Gas Cpn. Ord.	21/6—22/6	...	21/9—22/-
606,270	1	,,	2½	2½	Do. 4½ p.c. Prefd. Ord....	20/—22/-	...	...
936,338	1	Nov. 16	4½	4½	Do. 4½ p.c. Cum. Pref. ...	21/6—23/6	—/6	21/6—22/9
600,000	Stk.	Sept. 21	3½	3½	Do. 3½ p.c. Red. Deb. ...	99—102	...	101
130,000	,,	Aug. 10	8	5	Wakefield Ord.	140—145	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	105—110	...	...
80,000	,,	July 20	6	6	Weymouth Ord.	105—110	...	...
98,384	,,	Aug. 10	6	6	Wolverhampton 6 p.c. Pref.	127—132	...	...
160,000	,,	Dec. 14	5½	5½	Do. 5½ p.c. Rd. Db	105—110*	...	...
370,000	,,	July 20	6	4	York Cons.	115—125	...	...
90,000	,,	Dec. 14	5	5	Do. 5 p.c. Red. Deb. ...	108—113*	...	...
133,640	,,	July 20	6½	6½	Yorkstown (Cam.) 5 p.c. Cons.	150—160	...	...
120,808	,,	,,	5	5	Do. 5 p.c. Pref.	123—128	...	...
35,800	,,	Dec. 14	5½	5½	Do. 5½ p.c. Deb.... ...	128—133*	...	...

a Actual.

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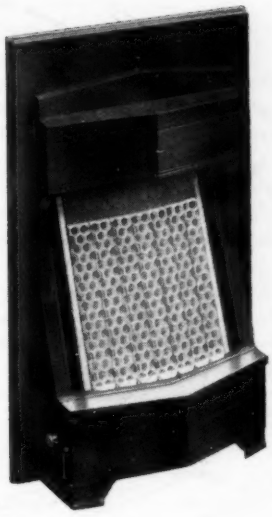

The

CANNON V *INCLINED*

The V-Inclined Gas Fire is a logical development of the Cannon Inclined Fire which has attained such great popularity during recent years. In this supplement a brief account is given of the Research Work which has formed the basis of its design.

CANNON SUPPLEMENT 2

THE ORIGINAL INCLINED GAS FIRE.

The original Inclined Fire was designed to improve the distribution of radiant heat in a vertical direction. Measurements with thermopiles and radiometers prove conclusively that the old-fashioned Fire in which the radiants were vertical wasted a substantial amount of its heat on the hearth. This wasted heat only served to produce currents of hot air which were immediately drawn into the flue. By inclining the Radiants backward, this heat was more usefully employed in warming the room. It was necessary to find the best angle of inclination, for obviously if the Fire was inclined too much, the hearth would not be warm enough, and too much heat would be radiated towards the ceiling. The best angle was found to be at 20° to the vertical. At this inclination the vertical distribution was improved to such an extent that the *useful* heat radiated from the fire was increased by 20 per cent. This was amply proved by Laboratory test. That the merits of the Inclined Fire are appreciated by both the Gas Industry and the public is clearly shown by the rapid increase in sales since its inception.

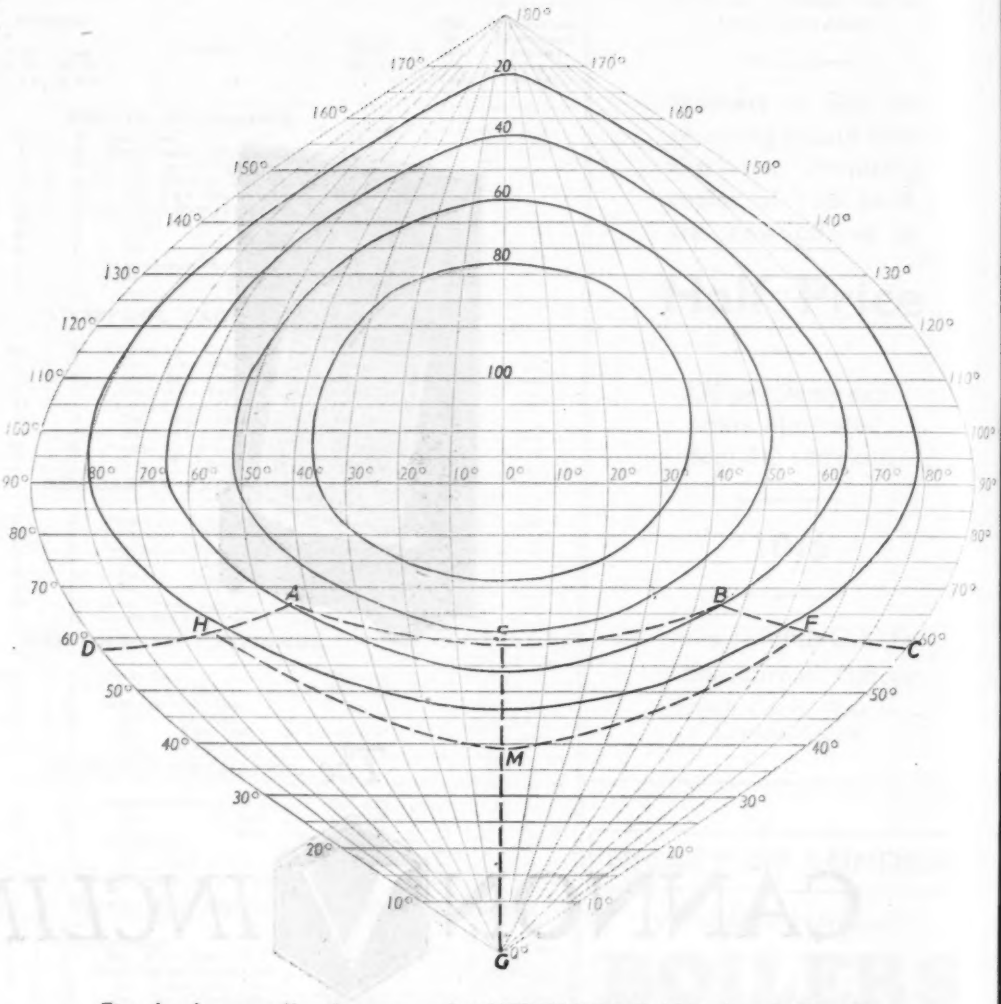

Fig. 1: Iso-candle diagram of "VERONICA" V-Inclined Gas Fire

EXPERIMENTAL RESEARCH.

The objects of our experimental work during the past five years have been to improve the Inclined Fire still further, particularly with the view of obtaining:

(*a*) A considerable increase in Total Radiant Efficiency.

(*b*) An improvement in Horizontal Distribution, comparable to the improvement in vertical distribution obtained by Inclining the Radiants.

(*c*) These advantages without sacrifice of consumption, for a gain in efficiency at the expense of rated consumption is of little value to the consumer.

(*d*) The standard of combustion to be such that when the Fire is tested in the manner prescribed by the British Standards Institution, no Carbon Monoxide shall be detected in the products entering the flue.

The V-Inclined Fire, in its various forms, is the final result of these Researches.

RADIANT EFFICIENCY.

To improve the Radiant Efficiency it was necessary—

(*a*) To construct a Radiant having a higher thermal output.

(*b*) To find a material for a fire back of greater insulating power and capable of withstanding higher temperatures than any which had previously been used.

(*c*) To construct a Burner capable of heating the Inclined Radiant to its maximum output without interfering with the combustion.

It was found that to obtain the improvement required in the Radiant, we could no longer keep to the former length of 8 inches. The new Radiant is nearly 10 inches long, with an increased internal surface area, and a close front-structure of the hexagon pattern found so successful in our previous "Vitaglo" Radiant. The new Fire Back is of an aluminous material, fired at a very high temperature. To increase the insulating power still further, the Back has

DISTRIBUTION.

It has been recognized for long that a source of heat that concentrates its radiation within a narrow angle, while serviceable for particular purposes—*e.g.*, as a Portable Heater—is not suitable for the equable warming of a living room. A narrow distribution produces "heat shadows" with all the attendant discomforts of scorching and draughts. In the V-Inclined Fire the Horizontal distribution of radiant heat is improved in a degree comparable to the improvement in vertical distribution already attained by inclining the radiants. This can best be demonstrated by means of Iso-Candle Diagrams shown here in which the distribution of heat from a V-Inclined Fire is compared with that from a modern highly efficient vertical straight fronted fire. Each fire has a certain direction of maximum intensity, and for convenience we have called this intensity 100 and assumed that the two Fires are set to give the same maximum intensity, a convention which prevents the diagrams from being complicated by any difference in radiant efficiency. In figure 2 the maximum intensity will be seen to be central and horizontal, and in figure 1 at 20° above the Horizontal as was to be expected. This raising of the direction of maximum intensity is made still more clear by the inclusion in the diagrams of the outline of a Tiled Hearth, shown as 40 ins. wide by 20 ins. deep, on which the Fire is assumed to be standing. The closed curve marked 80 encircling the point marked 100 represents a line through all points on the hemisphere, at which the intensity is 80% of the maximum, similar curves are drawn for 60, 40, and 20 per cent.

From the V-Inclined Fire the lines 80 and 60 fall further out on the hearth, and this reduction in heat on the floor close to the Fire is more than made up by the extension of the curves sideways. The curves of 20 and 40 per cent. intensity are carried out nearly 10° further on either side as compared with a straight-fronted Fire. This means that the number of people who can sit in comfort in front of the Gas Fire is considerably increased, and the formation of heat shadows is greatly reduced.

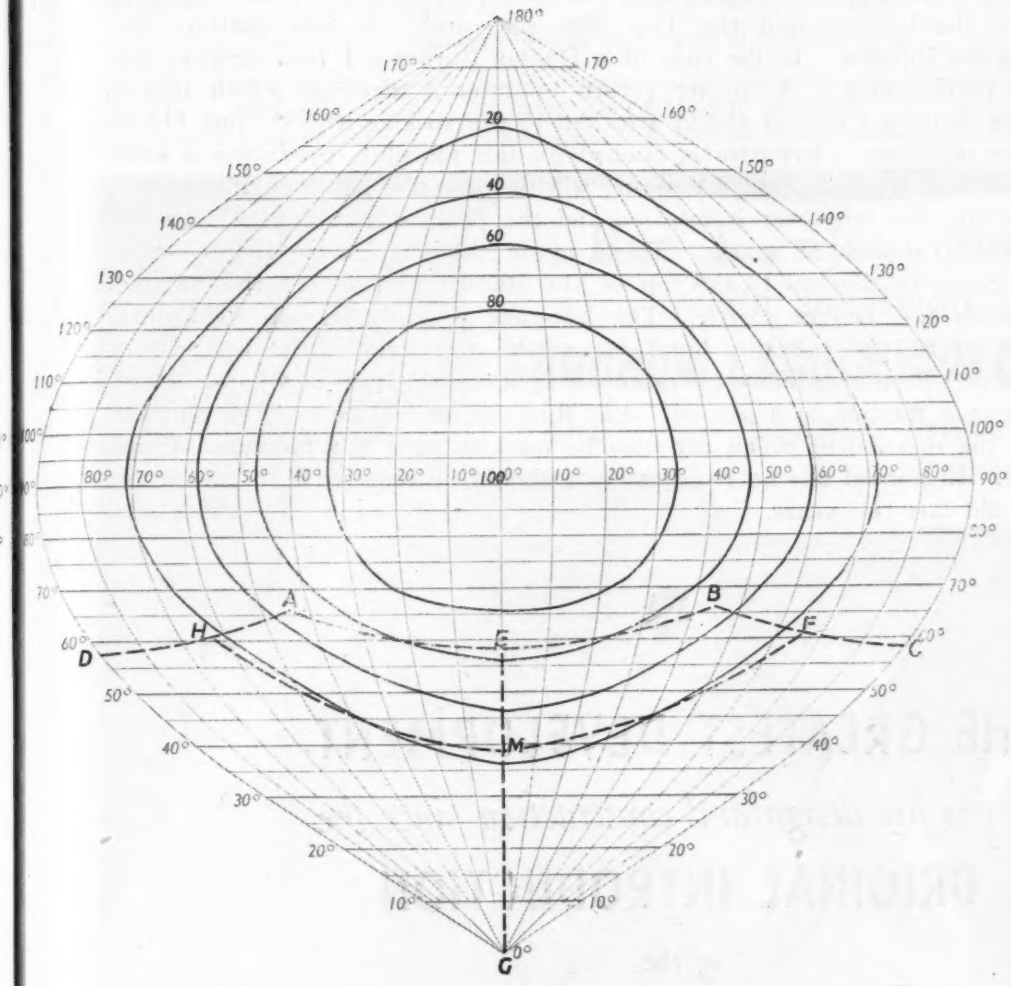

Fig. 2: Iso-candle diagram of Modern Flat-fronted Vertical Gas Fire

been increased in thickness to a maximum depth of 3 in. at the base. The escape of heat through the back is reduced to a minimum. When the Fire has been alight for over an hour at full gas rate, the back of the brick is still quite cold. After burning for many hours, with the face of the brick at white heat, the back will be found to be not hotter than boiling water. Only one material has been found capable of withstanding this high temperature-gradient without fracture or surface disintegration. The new Burner is fitted with a steatite atomizer of the type already used in the Inclined Fire, and differs only in its greater aerating power, which permits a very high efficiency to be obtained, at from 2,000 to 2,300 B.Th.U. per hour per radiant.

Every consumer requires a maximum service for a given capital outlay. The increase in efficiency is only appreciated if it also means an increased heat-output. A reduction in consumption will destroy the advantage of the increase in efficiency. At a consumption of 2,000 B.Th.U. per radiant, the radiant-efficiency of the V-Inclined Fire is unsurpassed by that of any other Fire on the market, and the heat output per unit of capital outlay greater than that of any other Fire.

CANNON SUPPLEMENT 4

FLINT IGNITION.

An Automatic Flint Lighter is fitted as a standard part of every V-Inclined Gas Fire, the Injector, the Lighter, and the Tap form one unit. A first quarter turn admits full gas to the Injector. In the case of a Duplex Burner a ¼ turn supplies full gas to the centre portion only. A further ¼ turn operates a trip-lever which lifts a steel pawl over the teeth of a ratchet pinion attached to the striking wheel. Just before the release of this trip-lever a bye-pass is opened on the tap plug, producing a keen jet of gas from a small tube close to the spring wheel. As the hand completes the movement of the tap, the trip-lever is released and the pawl turns the wheel against the flint, producing a shower of sparks. These ignite the gas leaving the bye-pass jet, and the long flame reaches up to the top of the Burner, and ignites the aerated mixture issuing from the Burner Ports. The bye-pass is, however, only held open against a spring return, and as the hand leaves the tap handle, the bye-pass is automatically closed. In the ordinary operation of lighting, the bye-pass flame is not alight for more than a fraction of a second. The flint can be replaced by the removal of the screw cap, the rotation of which can also be used to vary the pressure of the flint on the wheel. In normal use no re-adjustment should be required for 12 months, and the Flint should last two years.

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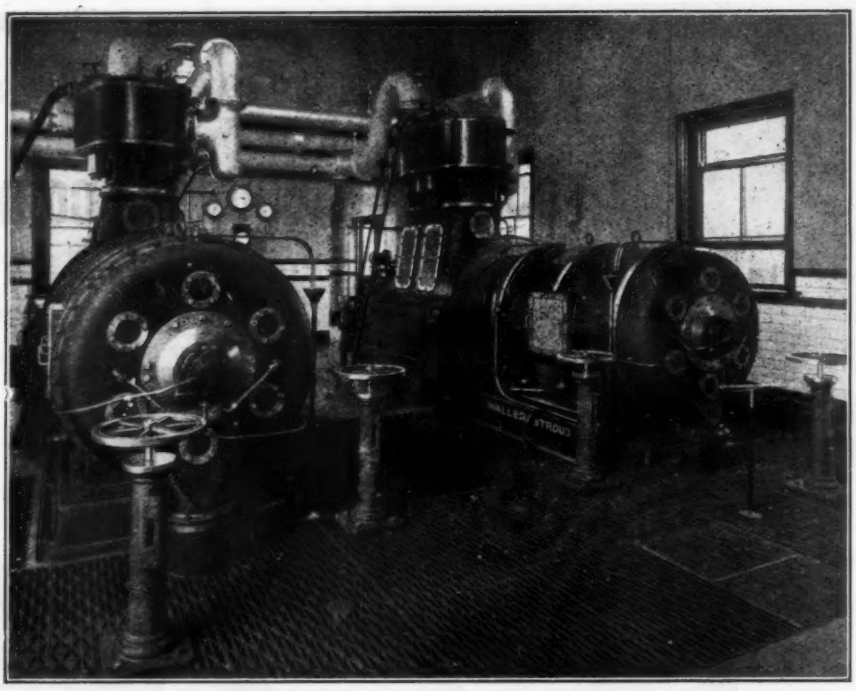

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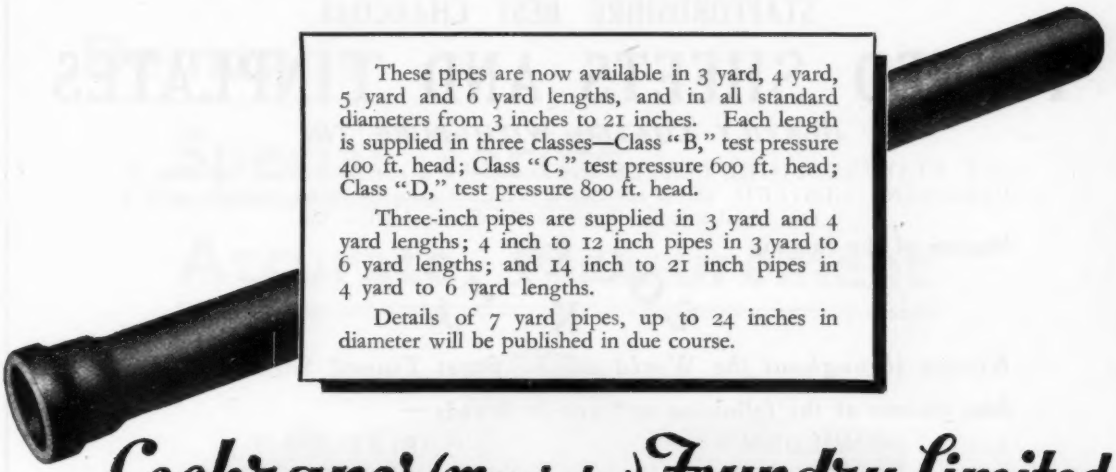

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Details of 7 yard pipes, up to 24 inches in diameter will be published in due course.

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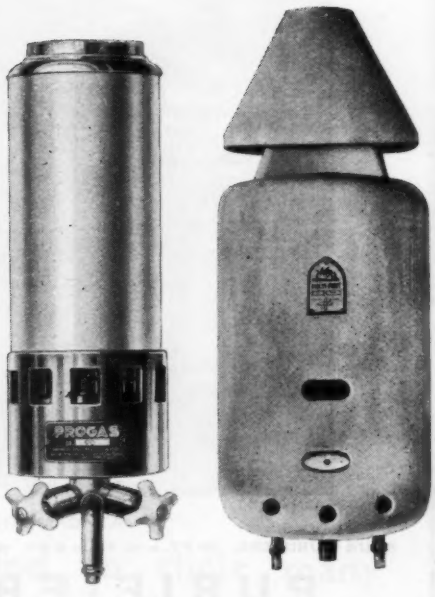

MODEL	CAPACITY PER MINUTE Gallons raised through 45° F.	GAS CONSUMPTION PER MINUTE C.V. 500 B.Th.U. per cubic foot	DIMENSIONS	
			Height	Width
D.L. 90	0·9	1 cubic foot	1′ 9″	0′ 4½″
D.L. 90 Multi-point	0·9	1 cubic foot	1′ 9″	0′ 4½″
D.L. 125	1·25	1·25 cubic feet	1′ 9″	0′ 6″
D.L. 125 Multi-point	1·25	1·25 cubic feet	1′ 9″	0′ 6″
D.L. 325 Multi-point	2·86	3·3 cubic feet	3′ 8″	1′ 5½″
D.L. 400 Multi-point	3·50	4·16 cubic feet	3′ 8″	1′ 5½″

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We claim that Progas Heaters are more efficient and more dependable in service. But you are the judge. We ask you to let us explain the points of Progas design to you, so that you can decide whether Progas is or is not something which you ought to show to your customers.

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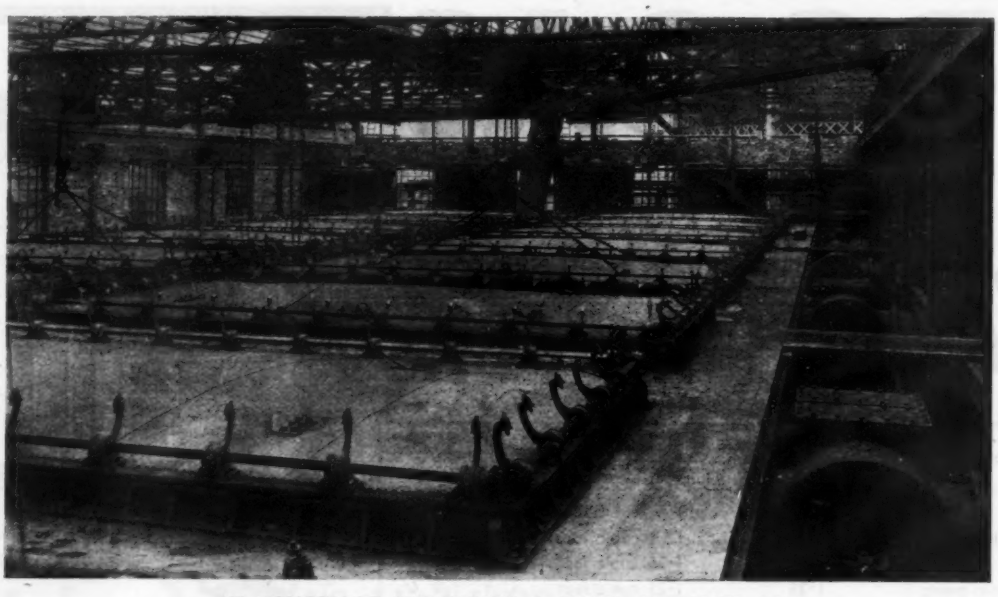

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Accurate Measurement

Thomas Glover & Co., Ltd., extend to their many friends in the Industry their Heartiest Good Wishes for a Prosperous New Year

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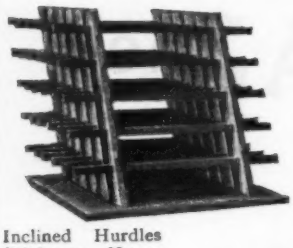

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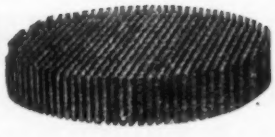
Inclined Hurdles (Light or Heavy Type) with Bottom Flat Grids.

Embody the latest improvements—are of the very best quality —and are in use extensively throughout the Kingdom.



Scrubber Grids.

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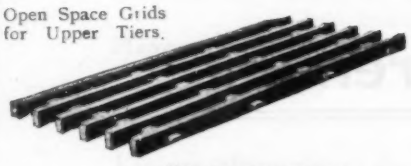

A Record Order for Purifier Grids.

Grids for the Purifier Plant of Messrs. I.C.I. at Billingham were supplied by CROSSLEY BROTHERS. This order included 176,400 Square Feet of Grids 2½ inches Thick.

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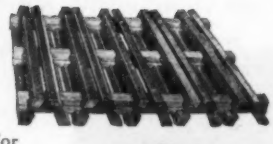

By arrangement with the late firm of W. SPENCER & SONS, Elland, we are the sole makers of their Specialities as follows: "Spencer Patent Double-Barred Flat Grids," "Spencer Heavy Type Hurdle Grids," "Spencer Flat Grids with Patent Bolts," "Spencer Climax Grids (heavy pattern)," "Spencer Self-Supporting Scrubber Grids."

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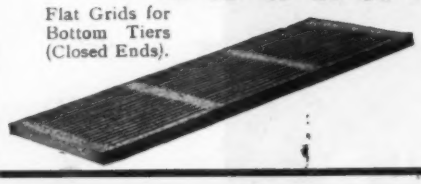

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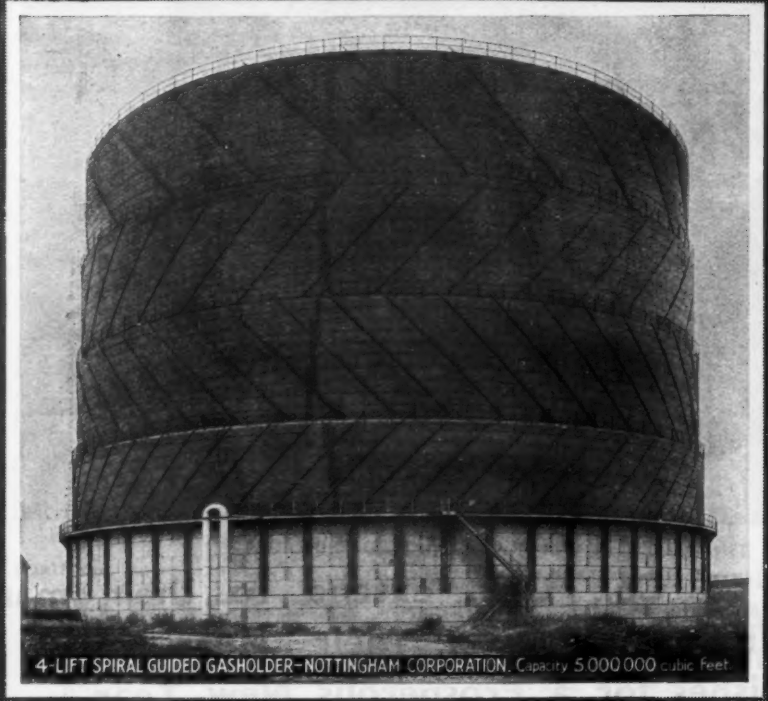
GRID WORKS, BISPHAM, LANCS.
Telephone: BLACKPOOL 51005 (2 lines). *Telegrams:* "CROSSLEY, BISPHAM."
LONDON OFFICE: Norfolk House, Norfolk Street, Strand, W.C. 2.



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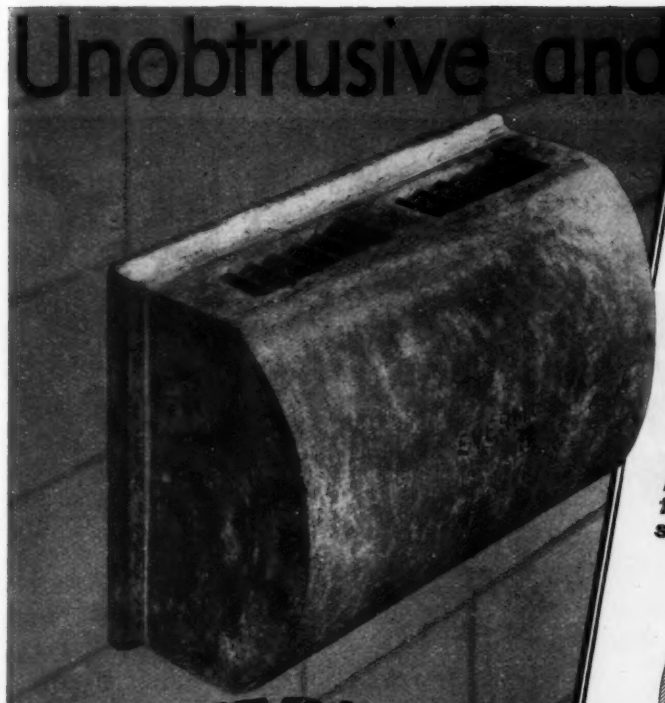
Unobtrusive and efficient.



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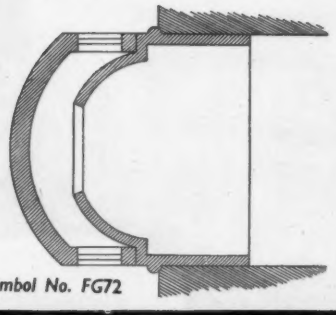

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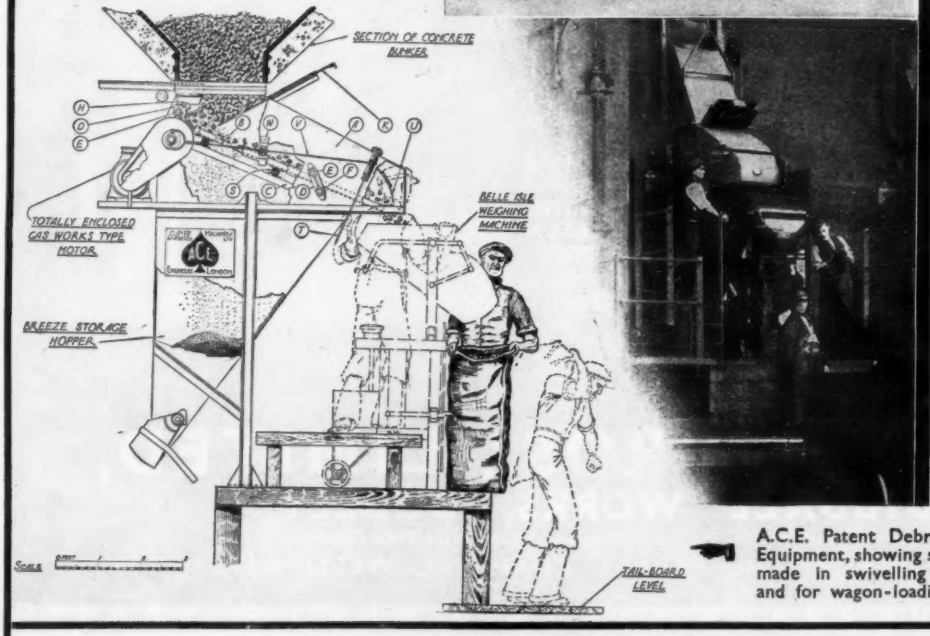

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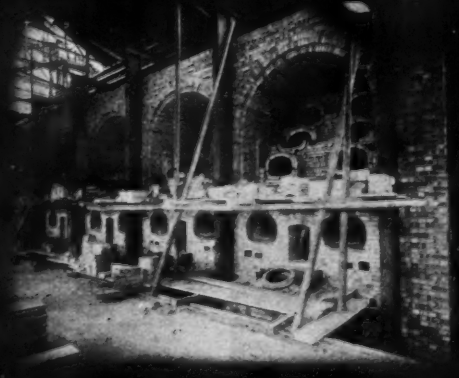

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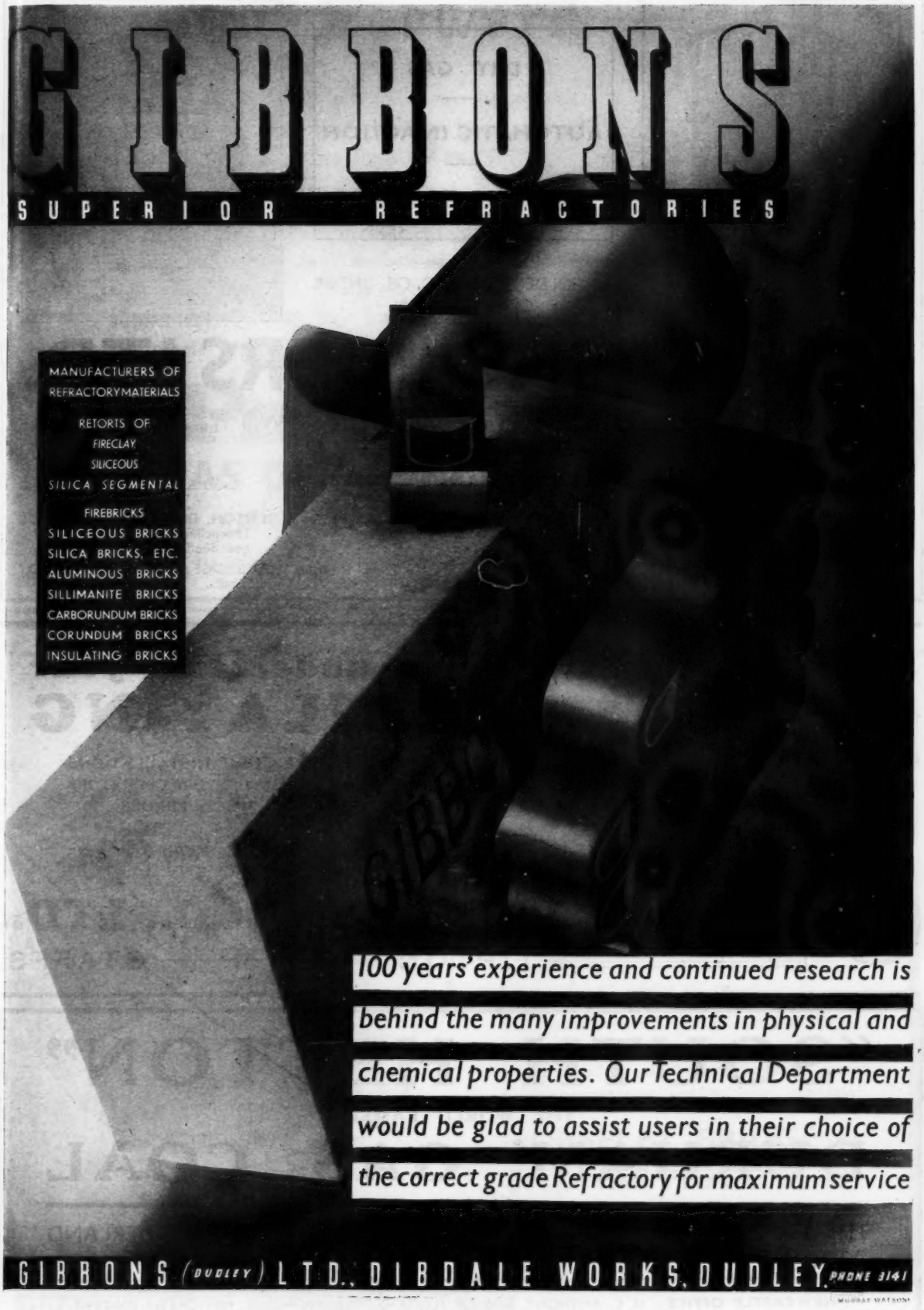
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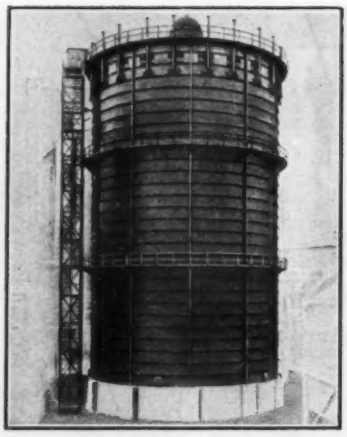

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UNIFORM PRESSURE

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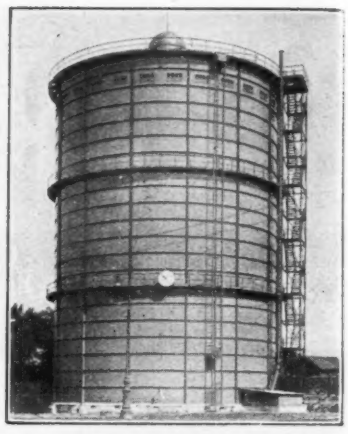

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Peebles
GAS GOVERNORS

We will welcome your enquiries in 1937.

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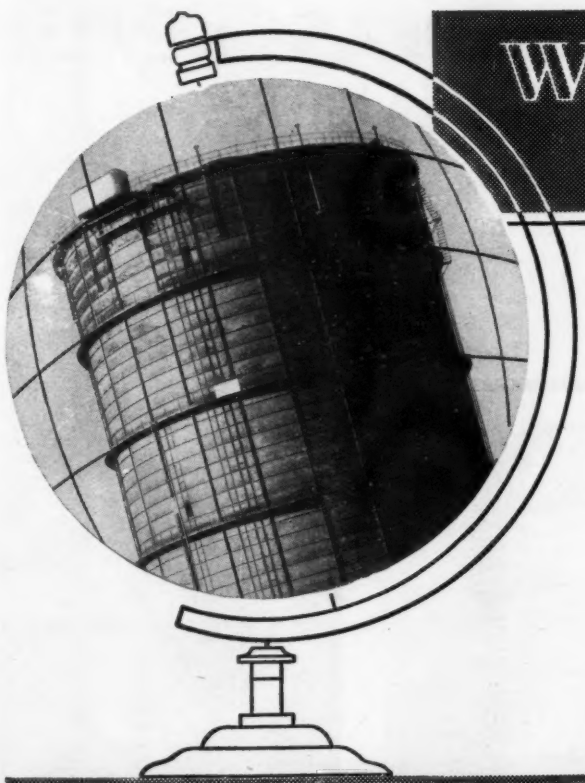
PEEBLES DISTRICT GOVERNOR
Fig. 42



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IT IS A GREAT TIME AND MONEY SAVER and SHOULD BE IN EVERY FITTER'S KIT

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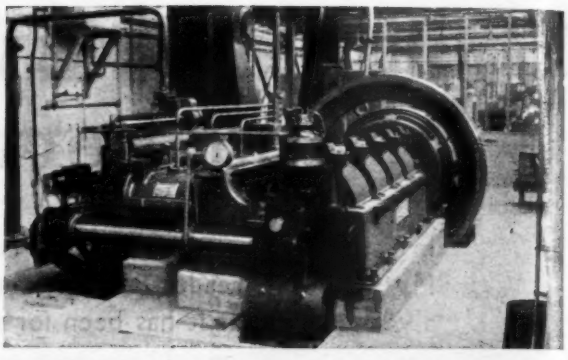

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ASHMORE, BENSON, PEASE & Co. LTD.
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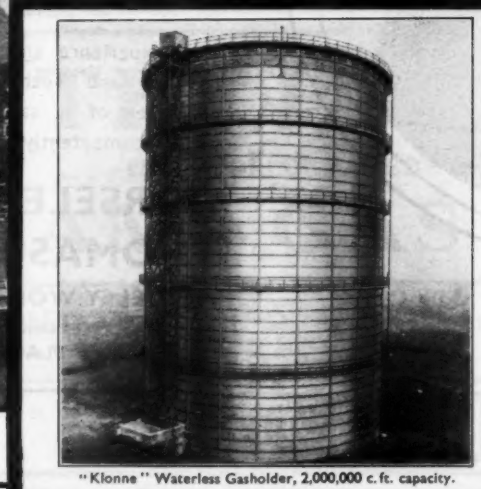

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We should like to send you complete particulars for your consideration.

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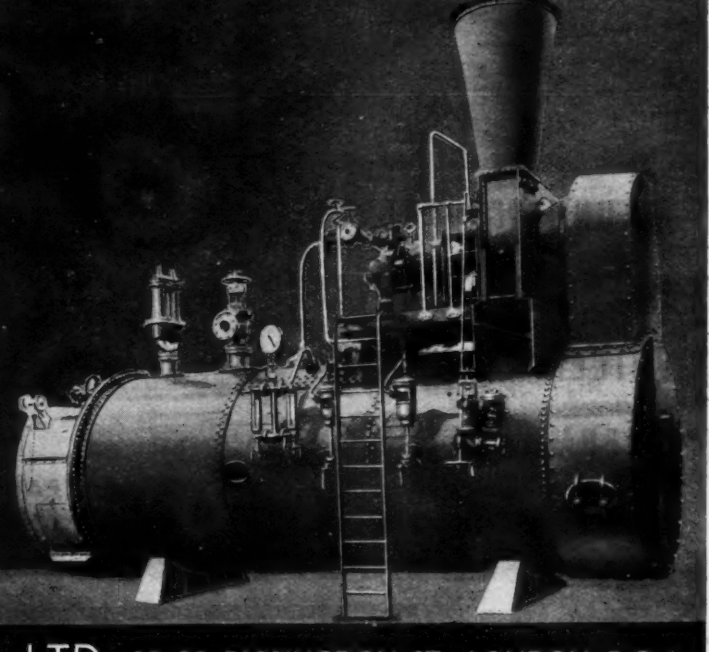

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TYPE "S G 10" Domestic Cooker Thermostat Combining Guaranteed Reliability with Superior Workmanship. Supplied also with larger capacity for Commercial Cooking Apparatus.

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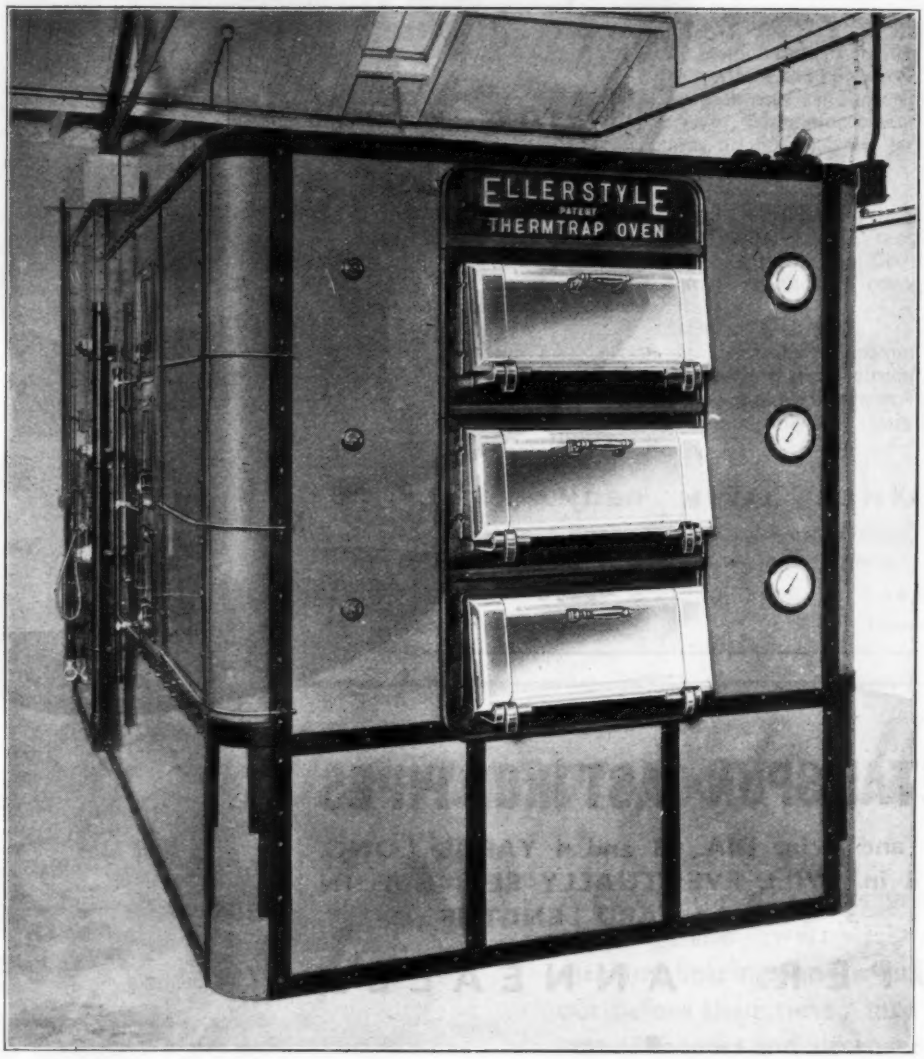
THIS UNSOLICITED PRAISE IS FROM A CLIENT WHO HAS NOW FAVOURED US WITH HIS FOURTH REPEAT ORDER FOR A THERMTRAP GAS FIRED OVEN



THIS THREE DECK 8 ft. x 5 ft. OVEN IS THE SUBJECT OF THE ABOVE TRIBUTE. 120 SQUARE FEET BAKING SURFACE WITH ABSOLUTE UNIFORMITY. GAS LIGHTING AND THERMOSTATIC CONTROL ARE FEATURES.

OUR DIRECTORS AND STAFF WISH ALL ENGAGED IN THE GAS INDUSTRY A VERY PROSPEROUS NEW YEAR AND A PHENOMENAL DEMAND FOR THERMS IN 1937.

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**3 in. and 4 in. DIA., 3 and 4 YARDS LONG.
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Centrifugally cast in sand-lined moulds.
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FLEXIBLE JOINTS

Clamp type and bolt type. Give 8 degrees
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Gas Industry

"EXPAMET"
EXPANDED METAL
British Steel
British Labour

Complete distribution of stress
IN ALL DIRECTIONS

"Expamet" Expanded Steel Reinforcement for Concrete is entirely to be relied upon in either skilled or unskilled hands, and the steel goes where it is planned to go without expensive setting out and labour.

It is a double-way reinforcement which, owing to its formation, cannot slip within the concrete. The respective meshes "key" into each other and interlock where sheets overlap; thus a layer of reinforcement may be made absolutely continuous no matter how large the area to be treated.

As meshwork with such dependable grip is the best form of reinforcement for resisting both tensile and thermal stresses, "Expamet" Expanded Steel-Concrete slabbing is eminently adapted for heat and fire resistance, as well as for load carrying.

The distribution of stress by "Expamet" is complete, for there is steel to transmit, in all directions, the stresses due to a load; and, no matter where it may be imposed, the load does not affect only the portion of the slab directly under it.

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Patentees and Manufacturers of Expanded Metal
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AIR FILTERS

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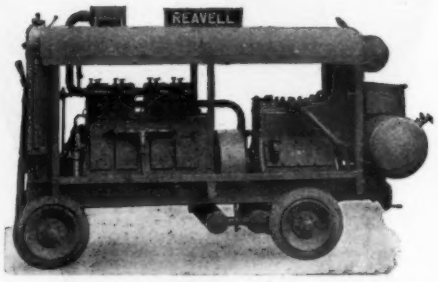

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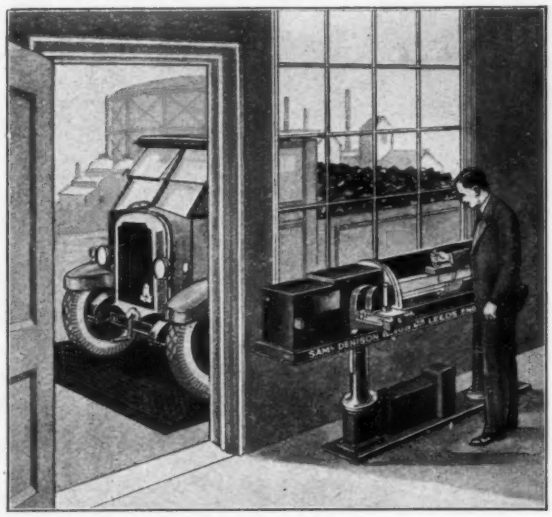

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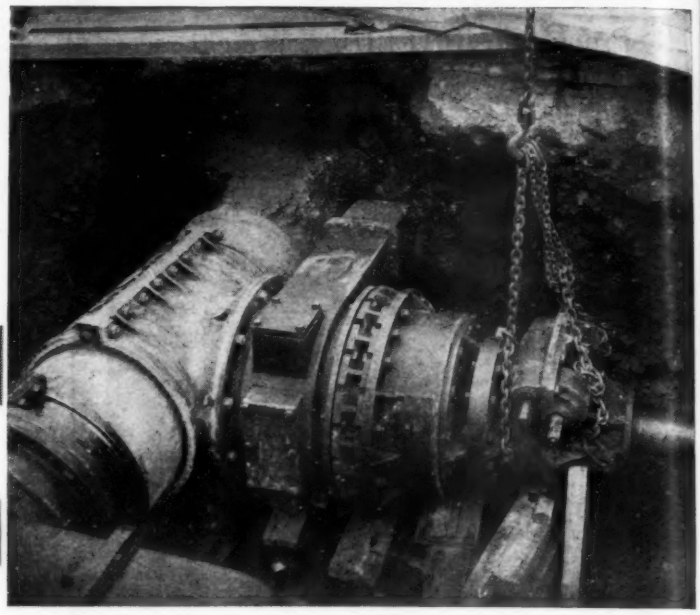

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Hanley	800,000
Hanley	800,000
Hartlepool	750,000
Hartlepool	765,000
Hassocks	80,000
Hastings	1,250,000
Haywards Heath	470,000
Haywards Heath	500,000
Hebden Bridge	200,000
Heidelberg	200,000
Hereford	525,000
Hertford	441,000
Hesale	150,000
Heywood	500,000
High Wycombe	752,000
High Wycombe	1,600,000
Hilversum	850,000
Hilversum	1,000,000
Hinckley	250,000
Hinckley	135,000
Holyhead	197,000
Hong Kong	900,000
Hornsey	1,000,000
Hornsey	1,000,000
Hornsey	750,000
Hornsey	750,000
Horsham	235,000
Houilliere de Lievin	2,900 000
Hull	1,500,000
Hull	1,000,000
Hull	1,600,000
Innsbruck	200,000
Ipswich	750,000
Ipswich	1,250 000
Ipswich	600,000
Jersey	564,000
Jersey	564,000
Kampen	350,000
Karlsbad	350,000
Kendal	329,000
Kettering	750,000
Kidsgrove	235,000
Kiel	1,880,000
Kilmarnock	500,000
Kilmarnock	585,000
King's Lynn	197,000
King's Lynn	400,000
Kingston-on-Th.	3,400,000
Kirkintilloch	360,000
Kirkintilloch	827,000
Kolozvar	100,000
Lancaster	500,000
Langley Mill	500,000
Largs	235,000
Lausanne	250,000
Lausanne	385,000
Lausanne	970,000
Lea Bridge	550,000
Lea Bridge	550,000
Lea Bridge	1,000,000
Lea Bridge	1,500,000
Lea Bridge	1,531,000
Leamington	600,000
Leamington	525,000
Leatherhead	705,000
Leeds	1,500,000
Leeuwarden	400,000
Leicester	2 700,000
Leiden	500,000
Leiden	575,000
Leigh	350,000
Lemberg	760,000
Letchworth	362,000
Letchworth	423,000

	Cu. Ft. Daily
Liege	1,000,000
Liege	750,000
Lille	860,000
Lille	1,410 000
Lincoln	500,000
Lincoln	893,000
Littlehampton	500,000
Liverpool	3,500,000
Liverpool	4,500,000
Liverpool	750,000
Liverpool	1,750,000
Liverpool	1,250,000
Liverpool	3,000,000
Liverpool	1,500,000
Liverpool	1,250,000
Liverpool	2,350,000
Liverpool	3,000,000
Liverpool	8,600,000
Long Eaton	430,000
Long Eaton	170,000
Long Eaton	250,000
Longton	600,000
Louvain	800,000
Lubeck	400,000
Luton	400,000
Luton	300,000
Lytham	750,000
Maastricht	200,000
Macclesfield	800,000
Madrid	1,147,000
Magdeburg	1,400,000
Maidenhead	225,000
Maidenhead	225,000
Maidenhead	175,000
Maidenhead	175,000
Maidenhead	200,000
Maidenhead	200,000
Maidstone	500,000
Maidstone	500,000
Malines	500,000
Malines	575,000
Malmo	350,000
Malta	400,000
Manchester	3,500,000
Manchester	3,500,000
Manchester	1,500,000
Manly, N.S.W.	300,000
Mansfield	675,000
Mansfield	675,000
Margate	960,000
Marlborough	100,000
Mayence	700,000
Melbourne	5,000,000
Merthyr Tydfil	300,000
Merthyr Tydfil	200,000
Middlesbrough	1,250,000
Middlesbrough	750,000
Middlesbrough	900,000
Middlesbrough	1,300,000
M/M. Woolston	9,000,000
Minehead	300,000
Monaco	275,000
Monaco	618,000
Monaco	618,000
Monaco	400,000
Complete Gasification	
Mons	300,000
Montevideo	1,222,000
Morecambe	333,000
Moscow	1,400,000
Munich	1,400,000
Namur	175,000
Narbonne	350,000
Nelson	400,000
Nelson	350,000
Neuchâtel, Switz.	250,000
Neuchâtel	250,000
Neuss	140,000
Newbury	250,000
Newcastle	2,500,000
Newcastle	3,000 000
Newcastle, N.S.W.	500,000
Newhaven	235,000
Newport Pagnell	188,000
Nice	1,295,000
Nice	1,295,000
Nietheroy	250,000
Nimes	420,000
North Middlesex	200,000
North Middlesex	200,000
North Middlesex	1,000,000
North Middlesex	1,600,000
North Middlesex	800,000
Complete Gasification	
North Middlesex	900,000
2nd Complete Gasification.	
North Sydney	500,000
North Sydney	500,000
Norwich	1,000,000
Norwich	300,000
Norwich	500,000
Norwich	1,500,000
Nottingham	1,000,000
Nottingham	1,000,000
Nuneaton	125,000
Oberhausen	175,000
Oldbury	500,000
Oldenburg	200,000
Ormskirk	170,000
Ostend	300,000
" Zandvoorde	700,000
Oswaldtwistle	200,000
Oxford	4,500,000
Oxford	2,250,000
Paisley	750,000
Palermo	968,000
Palermo	850,000
Paris:	
Clichy	4,000,000
Ivry	2,355,000
Landy	6,000,000
Landy	6,000,000
Landy	5,295,000
La Villette	4,000,000
La Villette	2,000,000
La Villette	2,000 000
Paris-Plage	125,000
Pau	550,000
Pavie	406 000
Pembroke	240,000

	Cu. Ft. Daily
Perigueux	350,000
Perth, W.A.	125,000
Perth, W.A.	1,000,000
Peterborough	750,000
Petone, N.Z.	200,000
Piggott & Co.	1,500,000
Plymouth	2,000,000
Poitiers	350,000
Pontypool	120,000
Port Elizabeth	400,000
Portsmouth	1,800,000
Portsmouth	2,000,000
Portsmouth	2,000,000
Posen	1,150,000
Prague	140,000
Preston	1,400,000
Pwllheli	60 000
Ramsgate	700,000
Reading	1,000,000
Reading	1,000,000
Reading	600,000
Redditch	500,000
Redhill	600,000
Redhill	600,000
Redhill	1,100,000
Reichenberg	400,000
Reval	350,000
Rhymney	175,000
Rhymney	250,000
Riddings	258,000
Ripley	120,000
Rochester	2,200,000
Rochester	2,800,000
Romford	300,000
Romford	350 000
Romford	1,200,000
Rothesay	500,000
Rotterdam	850,000
Rotterdam	1,500,000
Rotterdam	750,000
Rotterdam	750,000
Rotterdam	600,000
Rotterdam	2,000,000
Rotterdam	500,000
Rouiers, Belgium	250,000
Royston (Yorks.)	250,000
Rugby	1,000,000
Rugby	450,000
Rushden	425,000
Rushden	517,000
Rushden	225,000
Ryde	600,000
Ryde	600,000
Saffron Walden	235,000
St. Albans	700,000
St. Albans	580,000
St. Albans	1,500 000
St. Andrews	210,000
St. Andrews	503,000
St. Andrews	390 000
St. Etienne	3,864,000
St. Gallen	450,000
St. Ives (Hunts)	80,000
St. Nicolas, Belgium	250,000
Sté. Ch.Gr. Paroisse	1,320,000
Sté.Ch Gr Paroisse	2 900,000
Sté. I. & F. de Lens	1,130,000
Sté. I. & F. de Lens	1,130,000
Sté. Kuhlmann	1,285,000
Sté. Kuhlmann	3,200,000
Sté. Kuhlmann	2.150,000
Sté. Kuhlmann	3.830,000
Sté. Kuhlmann	23,520,000
Sté. Tubes Meuse	545,000
San Paulo	700,000
Sarragosse	264,000
Scarborough	1,350,000
Scarborough	1,300,000
Scarborough	1,350,000
Seaford	200,000
Shanghai	225,000
Shanghai	225,000
Shanghai	1,600,000
Shanghai	2,200 000
Shanklin	259,000
Shanklin	400,000
Sheerness	400,000
Sheerness	400,000
Sheffield	1,530,000
Sheffield	3,000,000
" Steel Prods.	4,500,000
Shirebrook	500,000
Shrewsbury	300,000
Shrewsbury	170,000
Sidmouth	225,000
Singapore	600,000
Sittingbourne	259 000
Solihull	500,000
Southampton	800,000
Southampton	500,000
Southampton	600,000
Southampton	700,000
Southampton	1,000,000
Southampton	1,450,000
Southend	1,250,000
Southend	900,000
Southend	900,000
Southend	600,000
Southgate	400,000
Southgate	500,000
Southgate	900,000
Southgate	500,000
Southgate	1,900,000
Southport	750,000
Southport	900,000
Southport	900,000
Southport	450,000
South Shields	650,000
South Shields	1,250,000
Stafford	500,000
Stafford	750,000
Stamford	120,000
Stettin	880,000
Steyning	150,000
Stirling	400,000
Stirling	970,000
Stockholm	1,500,000
Stockholm	1,750,000
Stockport	800,000
Stockport	600,000

	Cu. Ft. Daily
Stockport	400,000
Stockport	400,000
Stockton	500,000
Stockton	250,000
Stourbridge	300,000
Stourbridge	500 000
Sunderland	2,250,000
Sunderland	300,000
Sunderland	475,000
Sutton	1,269,000
Sutton	1,625,000
Swanage	300,000
Swanage	120,000
Swansea	750,000
Swansea	1,000,000
Swansea	450,000
Swansea	1,250,000
Swansea	2,000,000
Swindon	300,000
Swindon	450,000
Swindon	400,000
Sydney	1,000,000
Sydney	1 000,000
Sydney	1,000,000
Sydney	1 000 000
Sydney	8,250,000
Sydney	2,750,000
Taunton	225 000
Taunton	350,000
Tawe Valley	258,000
Teignmouth	200 000
The Hague	1,000,000
The Hague	500,000
The Hague	1,750,000
The Hague	1,500,000
The Hague	775,000
The Hague	1,500,000
The Hague	2,930,000
Tilburg	400,000
Tirlemont	120,000
Tokyo	2,000,000
Torquay	350,000
Torquay	350,000
Torquay	320,000
Tottenham	750,000
Tottenham	350,000
Tottenham	350,000
Tottenham	1,000,000
Tottenham	1,000,000
Tottenham	1.250,000
Tottenham	2,500,000
Tottenham	1,000,000
Tottenham	500,000
Tottenham	1,000,000
Toulouse	2,585,000
ToulouseNatl Wks.	2,400,000
ToulouseNatl Wks.	6,200,000
ToulouseNatl Wks.	3 730,000
Tournai	700,000
Tours	550,000
Trowbridge	250,000
Trowbridge	150,000
Tunbridge Wells	1,000,000
Tunbridge Wells	1,000,000
Tunis	175,000
Tynemouth	1,100,000
Tynemouth	1,100,000
Ulm	400,000
Union Chim.-Belge	1,977,000
Utrecht	1,000,000
Utrecht	1,000,000
Uxbridge	752,000
Uxbridge	1,000,000
Vancouver	3,800,000
Verviers	1,000,000
Vevey, Switz.	650,000
Victoria, B.C.	500,000
Vienna	6,000,000
Walsall	750,000
Walsall	375,000
Waltham	400,000
Waltham	140,000
Walton-on-Thames	970,000
Walton-on-Thames	650,000
Wandsbek	125,000
Wandsworth	1,800,000
Wandsworth	4,230,000
Wanganui, N.Z.	376,000
Ware	150,000
Ware	282,000
Warwick	125,000
Wasmuel	500,000
Watford	300,000
Watford	350,000
Watford	400,000
Watford	1,250,000
Wath	430,000
Weimar	100,000
Wellingborough	525,000
Wellingborough	525,000
Wellington	550,000
Wellington, N.Z.	350,000
Wellington	300,000
West Bromwich	550,000
Westgate	250,000
Weston-Mare	750,000
Weston-Mare	750,000
Wexford	100,000
Weymouth	500,000
Weymouth	658,000
Whaley Bridge	525,000
Whitstable	423,000
Widnes	500,000
Wiesbaden	850,000
Wigston	250,000
Winchester	225,000
Winchester	125,000
Winchester	410,000
Winchester	325,000
Woking	400,000
Wolverhampton	1,500,000
Wolverhampton	1,000,000
Wolverhampton	250,000
Wolverhampton	400,000
Yarmouth	500,000
Yarmouth	125,000
Yeovil	340,000
Zwolle	200,000
Zwolle	2,10,000
Zwolle	700,000

Completed and Current Construction

Now Aggregates over 1,026,000,000 *Cubic Feet Daily*

Humphreys & Glasgow, Ltd., Humglas House, Carlisle Place, London, S.W.1

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General Gas
The 'BOUDOIR'
Fitted with the OUTSTANDING GAS FIRE BURNER OF THE AGE — — —
Unsurpassed for Efficiency and PERFECTLY SILENT
The Switch Control is situated in a convenient position for easy manipulation—the ideal Fire for every Consumer
Silent
AUTOMATIC LIGHTING
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THOMAS
GLOVER
METER

SIMPLICITY
ITSELF

Made by THOMAS GLOVER & CO. LTD. · Gothic Works · EDMONTON · LONDON N.18 · & BRANCHES

Reliability

W. PARKINSON & CO. LONDON BIRMINGHAM & BELFAST
INCORPORATED IN PARKINSON & COWAN (GAS METERS) LTD.

W-D VERTICALS

ORDERS RECEIVED IN 1936

	Tons per day
■ AALBORG (2nd Installation)	38
■ ALLOA	97
■ ASCOT (2nd Installation)	10
□ BIRMINGHAM (Swan Village)	155
□ BRADFORD	198
■ CAMPBELTOWN	20
■ CLECKHEATON (3rd Installation)	52
■ DUNSTABLE	37
■ DUNSTABLE (2nd Installation)	37
■ EDINBURGH (3rd Installation)	280
■ ELLAND	36
□ FULHAM	338
□ HINCKLEY	119
■ LINLITHGOW	8
□ LIVERPOOL	207
■ MODDERFONTEIN	16
□ ODENSE	38
■ PENZANCE	30
■ PRESTATYN	17
□ ROCHDALE	180
■ ROWLEY REGIS (2nd Installation)	12
■ SALTCOATS (2nd Installation)	11
■ SOLIHULL	74
■ SYDNEY (N.S.W.)	210
■ WARRINGTON (3rd Installation)	80
■ WESTON-SUPER-MARE	109

■ Signifies a new installation
□ Indicates reconstruction to upward heating

Buy experience; it pays in the "long run"

W-D

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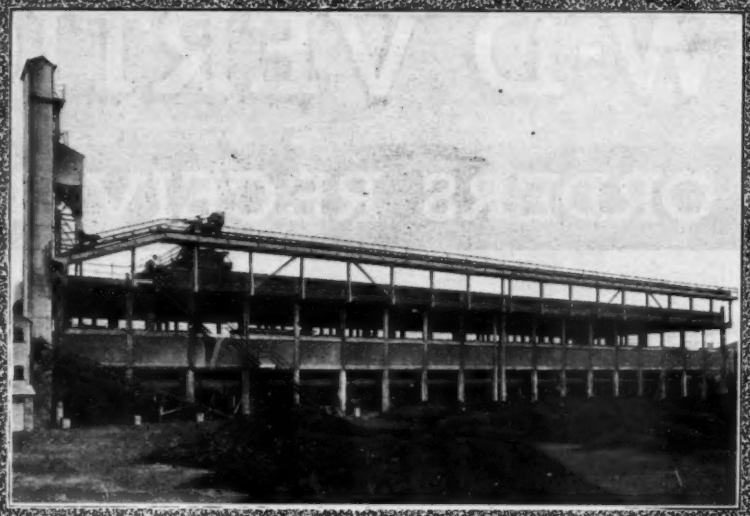
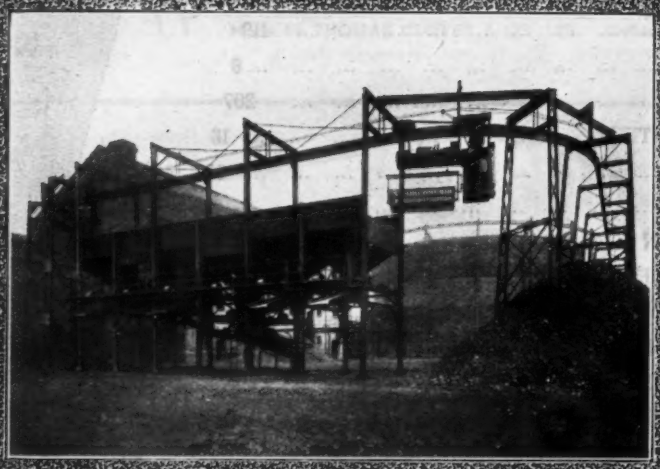
Members of the Society of British Gas Industries
Telegrams: "Retortical, Sowest, London." Telephone: Victoria 8631 (6 lines)

T.G.S.

Handling



Specialists

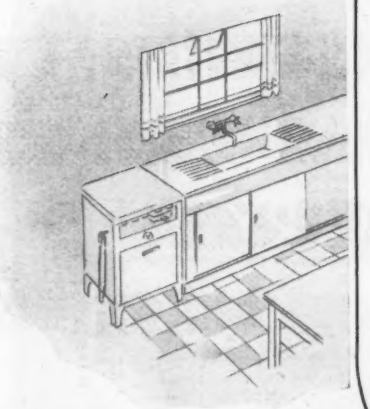


Robert
Dempster
AND SONS, LIMITED
ELLAND, YORKS.

LONDON OFFICE: 16, Queen Anne's Gate, Westminster, S.W. 1.

A new principle....
a new refreshing smartness....

which will delight your consumers



The
RENOWN
GAS COOKER
Registered Design.
by
PARKINSON

The whole aspect of cooker selection has been completely revolutionised—no longer is utility alone the deciding factor; the housewife of to-day demands a cooker the appearance of which makes it worthy of a place in her modern labour-saving kitchen. The 'RENOWN' gas cooker will appeal to your consumers, for it combines beauty of design with the highest degree of cooking efficiency. Wherever the 'RENOWN' is exhibited it is received with acclamation and admiration—indeed the ambition of every housewife who sees this modern cooker is to own one.

The cooker which is setting a fashion!

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London Showrooms - Terminal House . Grosvenor Gardens . S.W. 1

MEMBER OF THE SOCIETY OF BRITISH GAS INDUSTRIES

MODERN FIRE DESIGN

THE

¶ The introduction of the High "Beam" design, with its clean lines and flat front, provided opportunity for establishing a new technique, simple and easily assimilable in the most ultra-modern interior decorative schemes.

The price lists of the Radiation firms illustrate an attractive series of models.

The

HIGH BEAM

(TRADE MARK)

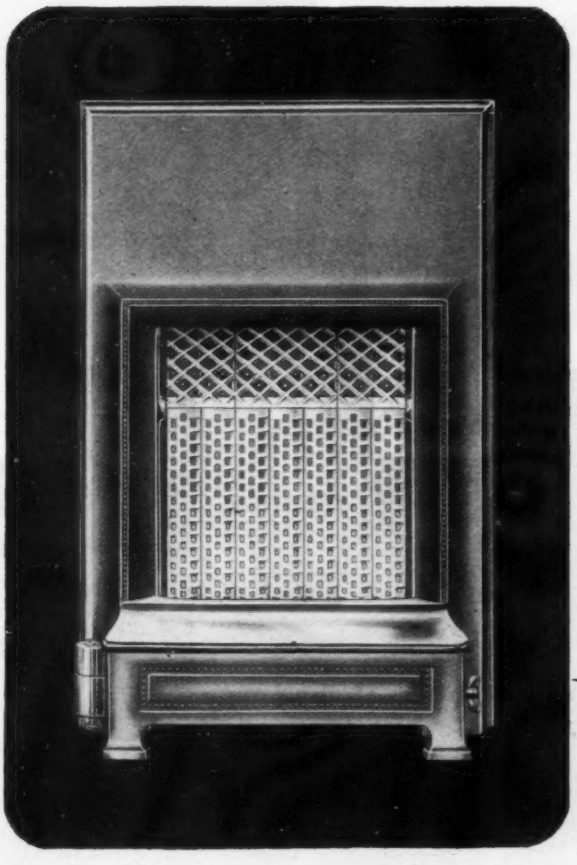
GAS FIRE

ONE THERM SAVED IN EVERY EIGHT

and more heat!

N IS ESSENTIAL IN PRESENT DAY HOME

THE High "Beam" is the most modern design of fire demonstrably linked, through a continuous line of the Industry's most important Gas fire developments, to the earliest successful examples. It is to be expected that the many advantages enjoyed by the firms associated in Radiation Ltd. should always result in their appliances taking the lead, because the wealth of their individual and collective experience enables them to avoid unpractical excursions; to maintain that step-by-step progress for which Time has proved conclusively that there is no real substitute.



Adopt the High "Beam" and be sure of interest, security and a capital appreciation!

Please note specially the following:—

Patent Self-lighting Gas tap.

A 12½% cut in consumption with increased heat.

Radiants of improved design, robust and long-lived.

A remarkable series of colour finishes.

Radiation

The Cannon Portray Heater

Portable Warmth in its latest and most attractive form

Manufacturers: Cannon Iron Foundries, Ltd., Deepfields, Nr. Bilston, Staffs. London Office and Showrooms: Thames House, Westminster, S.W. 1.

. . . should be placed in a SUSSEX Cooker. Seriously though, a SUSSEX will satisfy the needs of the most fastidious, its appeal being divided equally between the quality of the cooking and its very attractive appearance. The oven design in particular is noteworthy, for it is equally successful with milk puddings, custards, etc., or with the baking of three tins of "smalls" at one time—thanks to the two burners.

"Mainstat" oven heat control, reversible grid shelves, enamelled shelf supports, new back plate design, and patent levelling device for the plate rack suggest valuable sales points for the SUSSEX series. Literature is available on request

Sussex Gas Cookers

R. & A. MAIN LIMITED, LONDON AND FALKIRK

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THE SUTHERLAND METER CO LTD

TRADITION

ALWAYS HAS BEEN "ATTENTION" TO CUSTOMER'S NEEDS

Large meters 700 cu. ft. and upward fitted with trolley wheels. Saves labour in handling and moving into position.

Unnecessary shock to mechanism is reduced to minimum.

Finest workmanship throughout all Sutherland products.

Small H.C. meters to suit requirements with enclosed or open top. Radial Valves and Du-slot attachment.

THE
SUTHERLAND METER CO LTD
ELECTRIC AVENUE · WITTON · BIRMINGHAM

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NOW READY ··· NOW READY ··· NOW READY

The Gas Salesman's Pocket Book 1937

Items that feature this year

- Full technical and fitting data on refrigerators.
- "Zones of Comfort" charts for use with different types of gas heaters.
- Tables giving at a glance the actual oven temperatures at all settings of the different makes of cooker thermostats.
- Tables indicating what types of governor are applicable to various uses and suitable for fitting to different appliances.
- Data on copper tubing for use with capillary soldered joints.

A noteworthy feature of the 1937 Pocket Book is the inclusion of a new section on Refrigeration giving full particulars of the gas refrigerators available and a general comparison of gas and electricity for the refrigeration load. The book as a whole has been more closely sectionalized, and many new tables have been added. The industrial section has been expanded, and a fuller index still further facilitates ready reference. Particular attention has been paid to the question of estimating for different requirements in the domestic use of gas, the information on appliances being much more comprehensive.

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DOMESTIC UTILIZATION OF GAS

PART 2

by

NORMAN S. SMITH, B.Sc.
Assoc.M Inst.Gas E.
Technical Editor, "Gas Journal" and "Gas Salesman"; Editor of the "Gas Salesman's Pocket Book"

and

R. N. Le FEVRE
M.Inst.Gas E., A.I.Mech.E.
Officer-in-Charge of Training, Gas Light and Coke Company; Assistant Head of Department of Gas Engineering and Supply, Westminster Technical Institute

In common with its forerunner, Part 2 of "Domestic Utilization of Gas" is noteworthy for the Authors' originality of approach, facility of expression, and, above all, intimate knowledge of the problems which confront the gas salesman. *Part 2 of "Domestic Utilization of Gas" is a corollary to, and in no way a revision of, Part 1*; and its teaching carries on along lines of knowledge which in recent years have become essential to everyone concerned with the distribution and sale of gas and gas appliances.

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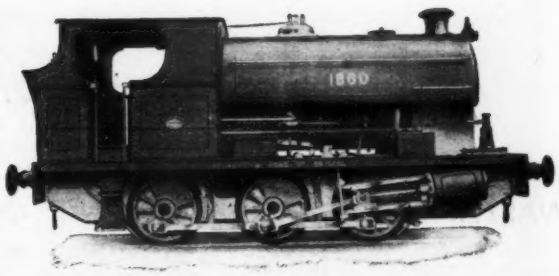

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The successful Contractor will be required to conform to the Standing Orders of the Council relating to Contracts.

Tenders are to be delivered to the undersigned not later than Ten a.m. on Friday, January 15th, 1937.

No Tender will be considered except in a plain sealed envelope, which must bear the words "Tender for Portable Air Compressor—Gas Department," and shall not bear any name or mark indicating the sender.

E. B. SHARPLEY,
Town Clerk.

Town Hall,
Stoke-on Trent,
Dec. 21, 1936.

URBAN DISTRICT COUNCIL OF WINDERMERE.

(GAS AND WATER DEPARTMENT.)

THE Council invite Tenders for the Supply and Delivery of approximately:

(*a*) 1,680 Yards of 4-Inch Diameter
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Manufacturers' SPUN IRON PIPES and SPECIAL CASTINGS in respect thereof.

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Sealed Tenders must reach the undersigned not later than noon on Monday, the 11th day of January, 1937. No Tender will be received except in the official envelope provided, which must not bear any name or mark indicating the sender.

The Council do not bind themselves to accept the lowest or any Tender.

THOMAS WATSON,
Clerk to the Council.

Ellerthwaite,
Windermere,
Dec. 22, 1936.

CONTRACTS OPEN.
(*Continued.*)

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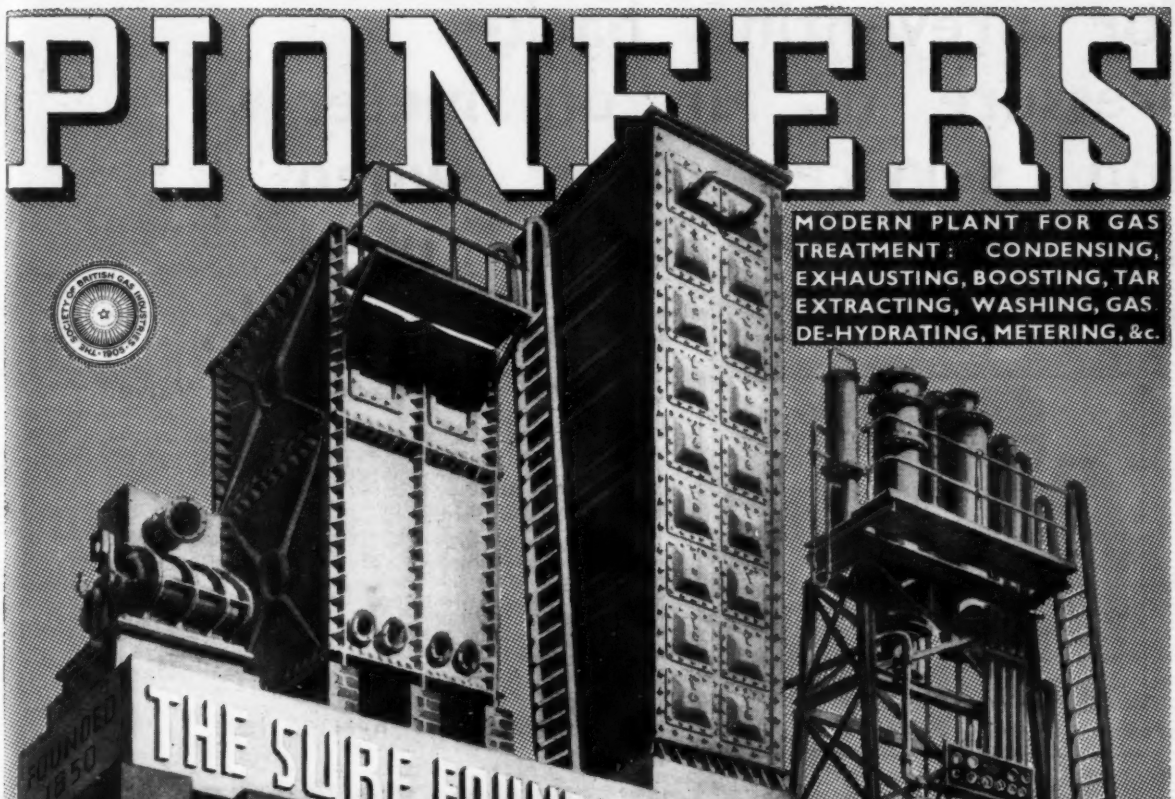

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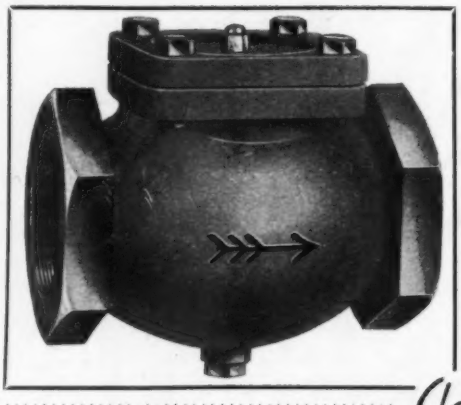

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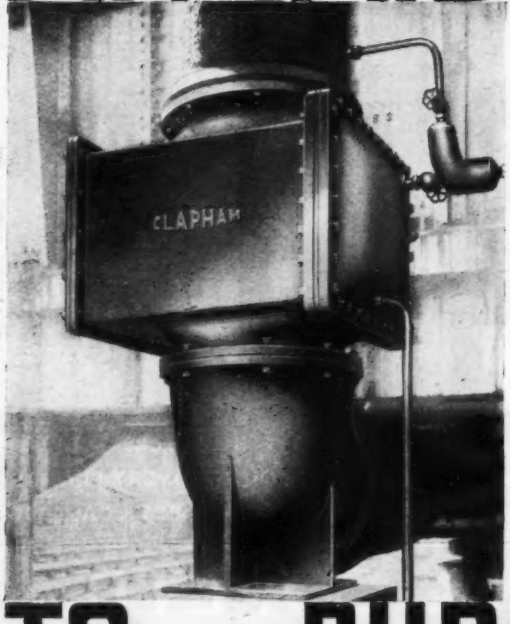

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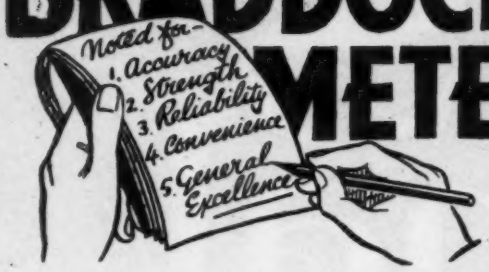

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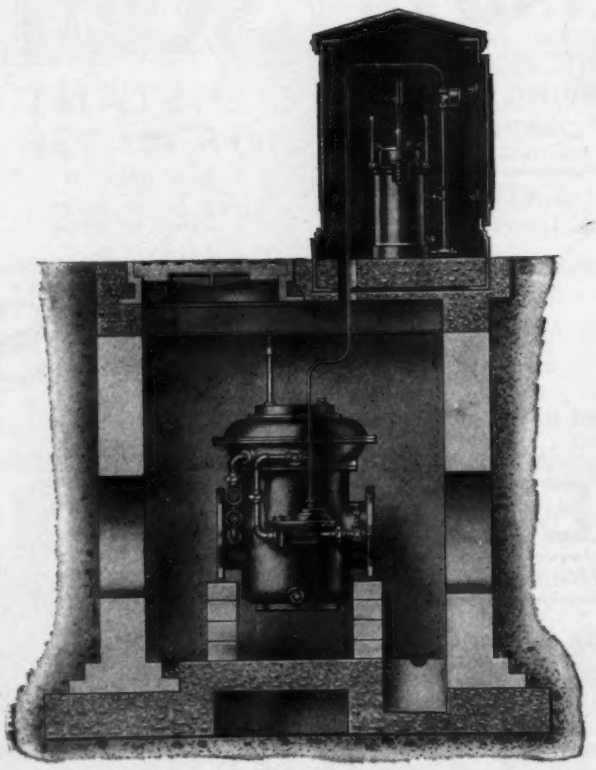

Fig. 824

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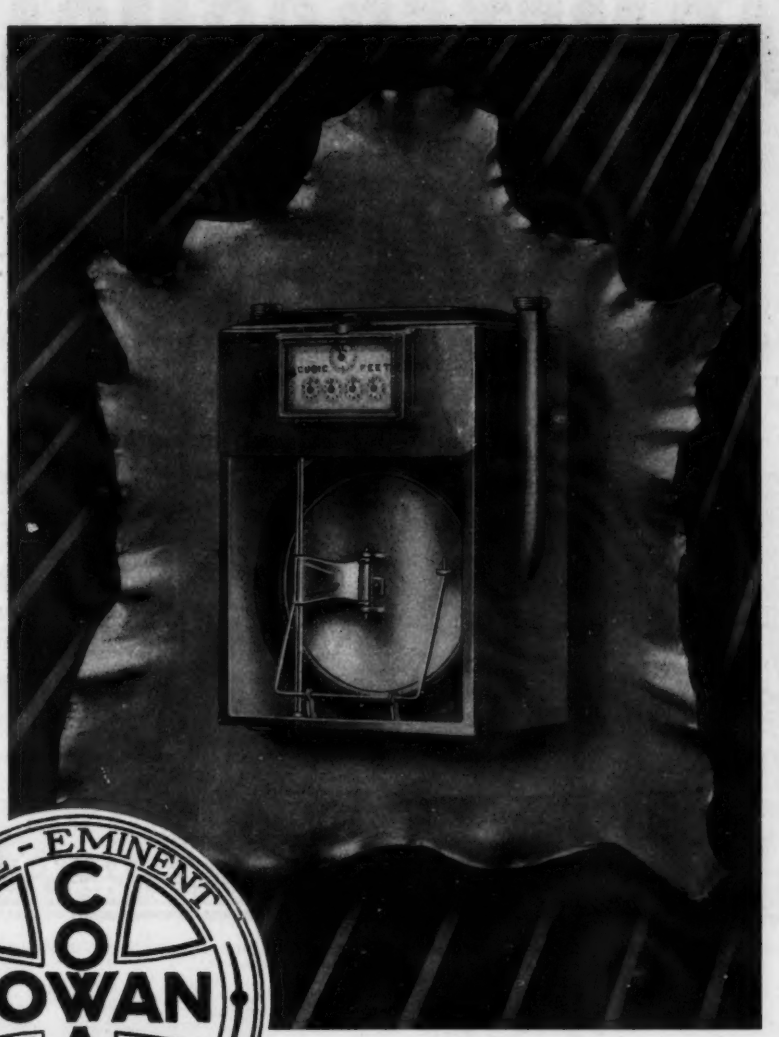

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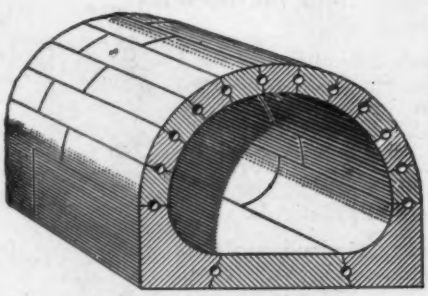

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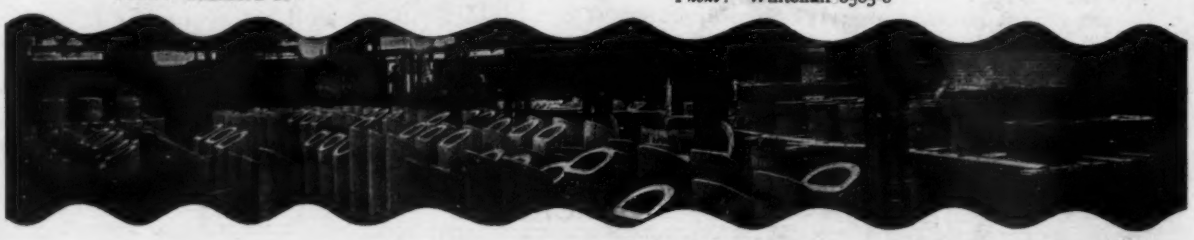

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